

**SUPPLY CHAIN MANAGEMENT PRACTICES IN
CONSTRUCTION AND INTER-ORGANISATIONAL
TRUST DYNAMICS**

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A thesis submitted in partial fulfilment of the requirements of the University of
Wolverhampton for the degree of Doctor of Philosophy

August 2014

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ABSTRACT

The poor trust culture in the construction sector is often considered an inhibiting factor to collaboration success in the United Kingdom (UK) despite reform efforts. Numerous reform initiatives tend to have focused on improvements in client and main contractor aspects of construction supply chain relationships, prompting claims that failure to integrate subcontractors, suppliers and consultants into collaborative arrangements remains a major shortcoming. Main contractor and subcontractor relationships therefore continue to be typified by such problems as late payments, charging fees to tender for work, award of contracts based on cheapest price rather than best value, negative margins and demand of retrospective discounts and cash rebates; all of which negatively impact on trust. Some main contractor organisations however, continue to embed supply chain management practices as a strategy for leveraging value from subcontractors. Such collaborative practices and their implications for inter-organisational trust development, and indeed overall project outcomes, have nonetheless received limited attention in construction management research, raising significant questions on the empirical basis for their implementation.

This research was thus undertaken to investigate strategic supply chain management practices adopted by UK main contractors and its implications for inter-organisational trust development during projects. The study adopts a multiple case study design so as to unravel complex subtleties of inter-organisational trust development in the main contractors' supply chain during projects. With four purposefully selected UK main contractor organisations that had implemented strategic supply chain management, data was gathered through a supply chain workshop, semi-structured interviews, passive observations and documentary analysis. From analysis of the data, it was revealed that strategic supply chain management practices of the main contractors were instrumental for trust manifestation across cognition, system and relational based dimensions. These practices served as constitutive elements of face-to-face interactions through which inter-organisational trust developed, whilst providing the institutional framework to which respective supply chain parties directed their psychological expectations.

These findings highlight the importance of maintaining a core of subcontractors from which the main contractor can leverage long-term value irrespective of economic climate. This can be achieved by adequately prioritizing relationally trusted subcontractors for sensitive and high risk work packages whilst ensuring that strategic supply chain management principles can be used to engender impersonal (cognition and system-based) trust dimensions amongst other subcontractors used on a project. Accordingly, a supply chain management oriented framework for engendering inter-organisational trust during projects has been developed based on the study findings and evaluated through semi-structured interviews with selected target participants. This framework does not only provide a systematic and coherent approach for implementing or benchmarking strategic supply chain management in a main contractor's organisation, but can also be used to prioritize and promote different trust dimensions and their associated behavioural consequences on projects, depending on perceived work package risks.

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LIST OF ABBREVIATIONS

BAA	British Airport Authority
B2B	Business-to-Business
B2C	Business-to-Customer
BIM	Building Information Modelling
BSF	Building Schools for the Future
BPR	Business Process Re-engineering
BSC	Balance Score Card
CFA	Continuous Flight Auger
CLM	CH2M Hill, Laing O'Rourke and Mace
CIOB	Chartered Institute of Building
CITB	Construction Industry Training Board
CPI	Continuous Performance Improvement
D&B	Design and Build
DFMA	Design for Manufacture and Assembly
FM	Facilities Management
H&S	Health and Safety
IOR	Inter-Organisational Relationship
IT	Information Technology
JIT	Just-in-Time
LEP	Local Education partnership
MC	Main Contractor
M&E	Mechanical and Electrical
MOD	Ministry of Defence
NEC	New Engineering Contract
ODA	Olympic Delivery Authority
ONS	Office of National Statistics
PFI	Private Finance Initiative
RDT	Resource Dependency Theory
SC	Subcontractor
SCM	Supply Chain Management
SCOR	Supply Chain Operations Reference
SME	Small and Medium sized Enterprise
SPV	Special Purpose Vehicle
SSIP	Safety Schemes in Procurement
TQM	Total Quality Management
UK	United Kingdom
VAT	Value Added Tax

ACKNOWLEDGEMENTS

My foremost thanks goes to the Almighty God who gave me the strength, favour and opportunity to embark on this journey. “I will bless the Lord at all times: his praise shall continually be in my mouth – Psalm 34: 1”.

I would like to express sincere gratitude to my director of studies, Dr Nii Ankrah, for his supervision, guidance, advice and mentorship throughout this research. Without his constructive feedback, support and advice on issues that sometimes extended beyond this research, I could not have come this far. I also extend sincere thanks to other members of my supervisory team, Dr Ezekiel Chinyio and Professor David Proverbs for their immense support, constructive comments and encouragement throughout this study. I also acknowledge the support and encouragement of Professor Issaka Ndekugri throughout my study period. I also wish to acknowledge the University of Wolverhampton for granting me the studentship opportunity to pursue this research.

To my beloved parents Kwesi Nyamekye Manu and Augustina Aframmea Manu and siblings Maureen, Yvonne, Elsie, Stephen and Shirley, I express my sincere gratitude as without your prayers, unflinching encouragement and support, I could not have come this far in my educational pursuit. I cannot forget to extend my appreciation to Veronica Nana Ama Asare for the wonderful support and encouragement throughout my years in higher education. Also to my wife, Offeibea Manu, I am grateful for your love, patience, understanding and encouragement. To friends who have supported me in diverse ways especially Dr Patrick Manu, Godfred Blagogie, Lynda Ankrah, Samuel Adu-Amankwah, Linda Arthur, Selorm Adukpo, Solomon Adjei, Joseph Mante, Dr Baffour Awuah Gyau, Stanlislus Adiaba and many others, I will forever remain grateful. I cannot forget to acknowledge all my research colleagues at the Faculty of Science and Engineering who contributed to making this journey a worthwhile experience. Finally, I am thankful to Apostle Akwasi Antwi and Rev. Light Zaglago for all your prayer support and encouragement.

DEDICATION

This thesis is dedicated to my family, especially my wife as well
as to the memory of my late maternal grandmother Dora
Aprakua Gyampoh.

CHAPTER ONE: INTRODUCTION TO THE RESEARCH

1.1 RESEARCH BACKGROUND

A great deal of construction management literature has pointed to the importance of trust as a facilitator of collaborative working and hence project performance (see e.g. Munns, 1995; Kadefors, 2004; Pinto *et al.*, 2009; Hartmann and Caerteling, 2010; Smyth *et al.*, 2010; Cheung *et al.*, 2011). Yet, the industry is still viewed as having a poor trust culture (Green *et al.*, 2005) that continues to inhibit the success of collaborative relationships (Dainty *et al.*, 2001; Akintoye and Main, 2007). This is against the backdrop of construction industry reforms in the UK that have sought to transform the unenviable adversarial track record of the sector into one that is more relational and trust-based (see Latham, 1994; DETR, 1998; Strategic Forum for Construction, 2002). Efforts to promote the relational agenda have however been arguably more prominent at the client and main contractor (MC) interface of the construction supply chain through for example client-main contractor partnering arrangements (see for instance Bresnen and Marshall, 2000; Matthews *et al.*, 2000; Naoum, 2003).

Kumaraswamy *et al.* (2010) have claimed that the failure to integrate subcontractors (SCs), suppliers and consultants into collaborative framework agreements has been a major shortcoming of recent collaborative efforts. Comparatively limited research has discussed issues related to integration of SCs and suppliers into collaborative arrangements with Dainty *et al.* (2001), Haksever *et al.* (2001) and Mason (2008) arguably being the most relevant of such studies. Dainty *et al.* (2001) revealed a belief held amongst SCs that MCs seek to enhance profitability at their expense – ultimately contributing to an apparent lack of trust in MC-SC relations. SCs were of the view that risks were passed down to them without fully acknowledging their own business requirements (Dainty *et al.*, 2001). Yet, for

future performance improvements to be realised in the context of the construction industry's reliance on subcontracting, there is the need for integration to be accepted by subcontractors that undertake majority of construction work and for benefits of such integration to be realised by all parties concerned.

It is perhaps for this reason that there still remains strong interest in how construction supply chains should be collaboratively managed especially with all the evidence from the manufacturing sector on how alliances have enhanced business performance (Love *et al.*, 2002). Walker (2007) for instance has pointed out the need to integrate all firms that contribute to the construction process – both upstream and downstream - thereby making it possible for SCs and suppliers to contribute to design, programming and other areas of collaboration. Such improvements in supply chain collaboration, particularly between MCs and SCs, could present significant implications for the realisation of future performance improvements in the construction sector. This makes the selection and management of SCs an area that requires significant research attention.

Smyth (2011) intimated that some contractors continue to embed collaborative practices as core competencies and dynamic capabilities for leveraging value in supply chains and networks. This was despite a period of economic decline where primary focus was on cost and business survival as against emphasis on collaborative practices that became prominent during the preceding economic growth era (Smyth, 2011). However, such collaborative efforts of MC organisations have lacked empirical attention in construction management research. King and Pitt (2009) for instance lamented the client-centric focus of construction supply chain management (SCM) literature to the detriment of contractor-driven approaches. Given the several decades of adversarial working relationships and consequent culture of mistrust (Ankrah *et al.*, 2009) that has inhibited achievement of supply-chain

integration especially amongst SCs (Dainty *et al.*, 2001), trust is likely to remain fundamental to such contractor-driven collaborative efforts.

A contractor-centric focus of SCM practices adopted by UK MCs and the likely implications of such for inter-organisational trust development especially during periods of austerity is likely to contribute towards long-term performance improvements. This study therefore aims to bridge this knowledge gap by complimenting first, earlier efforts of King and Pitt (2009) on SCM practices from a MC's perspective and then subsequently exploring the implications of such practices for inter-organisational trust development and its functional consequences during projects.

1.2 RESEARCH JUSTIFICATION

This research is driven by three main factors: 1) the significant role of subcontracting in the construction industry; 2) the limited empirical research on trust in the construction management context and 3) the problems associated with managing SC relationships.

1.2.1 The Significant Role of Subcontracting in the Construction Industry

The nature of construction work requires that a large number of firms - most of which specialise in a unique aspect of the construction process - work together under a MC that has overall responsibility of ensuring that client requirements are satisfied (Yik *et al.*, 2006; Lin and Gibson, 2011). On a typical construction project, studies have suggested that between 70-90% of construction work value could be subcontracted to smaller companies and specialist firms (see Chiang, 2009; Hartmann and Caerteling, 2010; Eriksson and Westerberg, 2011). Data from the UK construction statistics annual (Office for National Statistics, 2013) for instance revealed that out of the 247,105 construction firms registered in the UK in the third quarter of 2012, only 2.1% employed more than 25 people. 17.3%

were sole proprietorship firms with another 36.7% employing just one person. The UK construction industry is thus reliant on a lot of small-to-medium sized firms that find work as subcontractors under a main contract although some large specialist firms also work as subcontractors.

Tam *et al.* (2011) revealed that the use of multi-layered subcontracting systems in construction contributes largely to poor performance across aspects such as quality and time management, cost control as well as communication and coordination performance. Yik *et al.* (2006) also highlighted other subcontracting related problems such as inefficient communication, SC insolvency, and substandard work quality. Poor communication and lack of a common understanding between MCs and SCs during one-off type projects have also been cited as reasons for poor quality work in particular (Yik *et al.*, 2006; Chiang, 2009; Lin and Gibson, 2011). Other researchers (see Arditi and Chotibhongs, 2005; Ankrah, 2007; Chiang, 2009; Manu *et al.*, 2010b) have also highlighted poor health and safety (H&S) implications of subcontracting in the construction industry. Ankrah (2007) argued that SCs' disregard for site rules and poor housekeeping can increase opportunities for accidents. Thus, whereas subcontracting in the construction industry has contributed to organisational and managerial flexibility as well as provision of specialized services, it is often linked to the lacklustre performance of the industry (Chiang, 2009).

This reliance on SCs in the UK construction industry – with MCs often acting as de facto management contractors – and the consequent performance related problems associated with subcontracting suggests that research on how MCs manage SCs cannot be downplayed in any quest for performance improvements in the construction sector.

1.2.2 The Limited Empirical Research on Trust in Construction

The concept of trust has often been linked to SCM (see La Londe and Masters, 1994; Akintoye *et al.*, 2000; Mentzer *et al.*, 2001; Chen and Paulraj, 2004; Green *et al.*, 2005; Rimmer, 2009; Lönngren *et al.*, 2010). Research on trust development is however often biased towards different theoretical and disciplinary traditions. Economics researchers have investigated the extent to which institutional arrangements and contractual safeguards can be used to promote confidence (trust) during transactions (Zucker, 1986; Williamson, 1993; Desmet *et al.*, 2010). They have argued that when there are sufficient incentives to promote cooperation and sanction or deter opportunism, parties are more likely to trust others to behave or perform as expected. Sociologists have investigated the extent to which trust emerges from previous social interactions and existing social structures (see Lewis and Weigert, 1984; Lewis and Weigert, 1985; Sztompka, 1999; Gambetta, 2000; Möllering, 2001; Reed, 2001; Ammeter *et al.*, 2004; Möllering, 2005; Song, 2009) as well as how trust becomes institutionalized as a culture over time (see Yamagishi and Yamagishi, 1994; Fukuyama, 1996; Doney *et al.*, 1998).

Some researchers (e.g. Möllering, 2001; Bijlsma and van de Bunt, 2003; Fetchenhauer and Dunning, 2009) have pointed out the sometimes weak correlation between trust-oriented institutional contexts and the actual trusting behaviour that people display. Such arguments accentuate efforts by personality psychologists who focus on individual characteristics and traits as a source of trust (e.g. Rotter, 1967; Rempel *et al.*, 1985; Rempel and Holmes, 1986). As a result, two approaches to inter-organisational trust research have emerged - a micro-level psychological and a macro-level institutional approach to inter-organisational trust development (see section 3.2). Bachmann (2011) however indicated that as yet, the role of institutions in trust development is not sufficiently researched in empirical terms due to much emphasis on interaction-based sources (micro-level approach).

There have also been mixed findings about the influence of micro-level psychological and macro-level institutional factors to inter-organisational trust development in the construction sector. Institutional frameworks that foster integration and longer-term collaboration such as partnering have been associated with higher levels of trust (see for instance McDermott *et al.*, 2004; Laan *et al.*, 2011a). Lau and Rowlinson (2009) however revealed that long-term collaborative relationships such as partnering do not necessarily yield more trust than non-partnering projects. Phua (2012) called for an integrated approach to studying concepts such as trust as they are not only influenced by contextual and situational factors (macro-level factors), but also individual moods, emotions, attitudes, values and identity (micro-level factors).

Secondly, the relationship between trust and performance has been a controversial subject. Sako (2007) questioned the influence of trust in achieving business performance. Aubert and Kelsey (2000) undertook an experiment on the efficient operation of virtual teams and organisations which revealed that effective team performance was independent of trust formation. In construction management literature, trust has often been associated with cooperative behaviour amongst project parties and consequently successful project performance (see Munns, 1995; Kadefors, 2004; Eriksson and Laan, 2007; Hartmann and Caerteling, 2010; Smyth *et al.*, 2010; Laan *et al.*, 2011a). However, researchers such as Cox and Thompson (1997) have similarly questioned the relevance of trust in contractual relations as cooperation can emerge from other functional equivalents of trust such as control through the exercise of power and authority. This was argued to be particularly the case given the very fragile nature of trust during construction projects.

These mixed views on inter-organisational trust coupled with the claim that trust issues in construction are often conceptually discussed but rarely empirically explored (Laan, 2009)

underscores the need for more empirical insights. This study seeks to make further empirical contributions to trust research in construction especially with regards to MC-SC aspects of the construction supply chain which can be more problematic for trust development.

1.2.3 The Problems Associated with Managing Subcontractor Relationships

Earlier research has claimed that MCs who are able to build long-term collaborative relationships with SCs could experience indirect benefits such as effective communication and less risk and conflicts (see for instance Haksever *et al.*, 2001). The MC-SC interface of the construction supply chain however seems to be plagued by a host of problems which have implications for trust development and collaborative working. Greenwood *et al.* (2005) revealed the unlimited liabilities that SCs can be faced with in the event of project delays. A survey amongst UK SCs also revealed MC practices such as late payments, charging fees to tender for work, award of contracts based on cheapest price rather than best value, demand of retrospective discounts and demand of cash rebates from suppliers (Hurley, 2012). It was further reported that 97% of 250 surveyed SCs felt they were unfairly treated by MCs but chose not to report such unfair practices due to the fear of losing future work (Hurley, 2012).

The power imbalance in MC and SC relationships thus often results in unfair treatment (Yik *et al.*, 2006). Conversely, SCs also present their own trust-related problems to MCs as they sometimes lack the capacity to adopt modern quality management practices and are subject to high levels of staff mobility. This consequently promotes a negative attitude towards staff training (Lin and Gibson, 2011) and presents a limited time frame for trust to be developed with specific individuals. SC practices such as negative or sub-economic pricing (Hinze and Tracey, 1994) and disregard for site rules (Ankrah, 2007 pp. 254) also remain problematic issues that inhibit the development of confidence in SC performance. These trust related

problems call for further insights into effective SC management practices that can yield long-term value for the construction supply chain. Yet, Yik and Lai (2008) have lamented the limited research focus on subcontracting practice in construction.

Furthermore, Hartmann and Caerteling (2010) undertook an experiment to evaluate the interaction between price and trust on the procurement and selection aspects of MC and SC relationships. It was revealed that neither price nor trust could be downplayed during SC procurement although a more elaborate research was recommended to fully understand the trade-offs MCs have to make between price and trust during SC selection. Despite the strategic SCM practices adopted by some UK MCs (see for e.g. King and Pitt, 2009), trust-related issues remain empirically unexplored within such contexts. This research thus seeks to bridge the knowledge gap on SCM practices adopted by UK MCs and its influence on inter-organisational trust dynamics and their consequences during projects.

1.3 RESEARCH QUESTIONS

Based on the foregoing discussions, the following fundamental research questions have been raised:

RQ1: What constitutes the SCM practices adopted by UK MCs to manage SCs during projects?

RQ2: How does inter-organisational trust develop between MCs and SCs within the context of such adopted SCM practices during projects?

RQ3: What does trust mean to MCs and SCs involved in collaborative SCM relationships?

RQ4: What are the functional consequences of inter-organisational trust when considered within the context of the MC's supply chain during projects?

RQ5: How can inter-organisational trust in the MC's supply chain be engendered using SCM as a strategy?

1.4 RESEARCH AIM AND OBJECTIVES

The aim of this research is to explore inter-organisational trust development and its functional consequences *vis-à-vis* the different SCM practices adopted by UK MCs. The specific objectives are therefore:

1. To develop an understanding of supply chain management from generic management as well as construction management literature.
2. To develop an understanding of the concept of inter-organisational trust from generic management as well as construction management perspectives.
3. To empirically investigate how inter-organisational trust manifests and develops in the context of MC SCM practices alongside any associated functional consequences.
4. To analyse the collected data on SCM practices in the MC's organisational context and inter-organisational trust development during projects.
5. To develop a SCM oriented framework for engendering inter-organisational trust between MCs and SCs with potential performance benefits.
6. To evaluate the proposed framework using selected construction practitioners involved in SCM-related activities.

7. To draw conclusions from the study as well as make necessary recommendations on the use of strategic SCM practices to engender inter-organisational trust and its consequences during projects.

1.5 SCOPE OF STUDY

This research focuses on large UK MCs that have implemented SCM practices as a strategy to manage longer-term collaborative relationships with their SCs. Again, whilst the nature of subcontracting in the UK construction industry is multi-layered, this research is limited to supply chain relationships between MCs and first tier SCs. Additionally, the research focuses on trust at the inter-organisational rather than interpersonal level of analysis although the influence of interpersonal interactions between boundary-spanning members on inter-organisational trust development is given due consideration. Furthermore, although SCM is conceptualized from two different perspectives: strategic and operational perspective (see section 2.2), this study is grounded in a strategic SCM perspective.

1.6 RESEARCH DESIGN

The philosophical paradigm adopted for this study is interpretivism, which is founded on the belief that reality is subjectively constructed and for which the researcher has to constantly interact with the object of investigation as an ‘insider’ (Creswell, 2012) to uncover deeper meanings through interactive dialogue and interpretation (Ponterotto, 2005). Based on this philosophical position, a qualitative research strategy was adopted. Trust being a complex, abstract and psychological construct that is rooted in individual perceptions, a quantitative approach could hardly provide for a highly contextualized understanding of the process of inter-organisational trust development (Laan, 2009).

To answer the exploratory-type research questions posed in this study, a multiple case study design was adopted. This was also to facilitate the use of multiple sources of evidence (Yin, 2013) and to provide a platform for engaging with different boundary-spanning personnel from MC and SC organisations working together on live projects. The use of multiple sources of evidence here thus facilitates triangulation of results – developing converging lines of inquiry which make the study findings and conclusions more reliable (Proverbs and Gameson, 2008; Yin, 2013). Accordingly, case studies were undertaken with four (4) large UK MCs during an eight month period where data was gathered through semi-structured interviews, direct observations, documentary analysis and a workshop, albeit the use of these data collection methods varied across the different cases based on the level of access that was granted.

Within-case and cross-case analyses were undertaken by organising, coding and exploring emergent themes using the qualitative data analysis software NVivo version 9. Based on findings, a framework that integrates SCM practices, inter-organisational trust dimensions and its functional consequences was developed. This framework was subsequently evaluated from the perspective of selected supply chain managers and other relevant construction professionals.

1.7 STRUCTURE OF THE THESIS

The thesis is organised into eleven chapters as depicted schematically in Figure 1.1. The content of each chapter is summarised in the following:

Chapter 1: Introduction to the Research

This chapter presents the background to the thesis and provides justification for the research based on existing knowledge gaps. This chapter also presents the research questions, aim

and objectives, scope and snapshot of the research design. Finally, this chapter outlines the thesis structure.

Chapter 2: Strategic Perspective of Supply Chain Management

This chapter is the first part of the literature review that explains the supply chain management concept and its evolution, first in the manufacturing sector and then subsequently in construction. The issues that have sustained MC interests in strategic SCM are also discussed before outlining avenues for further contributions that have necessitated this present work.

Chapter 3: Conceptualization of Inter-organisational Trust

This chapter is the second part of the literature review that presents a multi-disciplinary conceptualization of inter-organisational trust and its functional consequences in inter-organisational relationships. Trust-based collaborative agenda in the construction industry post Latham and Egan era is further placed in perspective and the need for sustained efforts in promoting trust across the construction supply chain is justified. The opportunity to empirically explore the contribution of strategic SCM practices of UK MCs and their influence on inter-organisational trust development is also discussed.

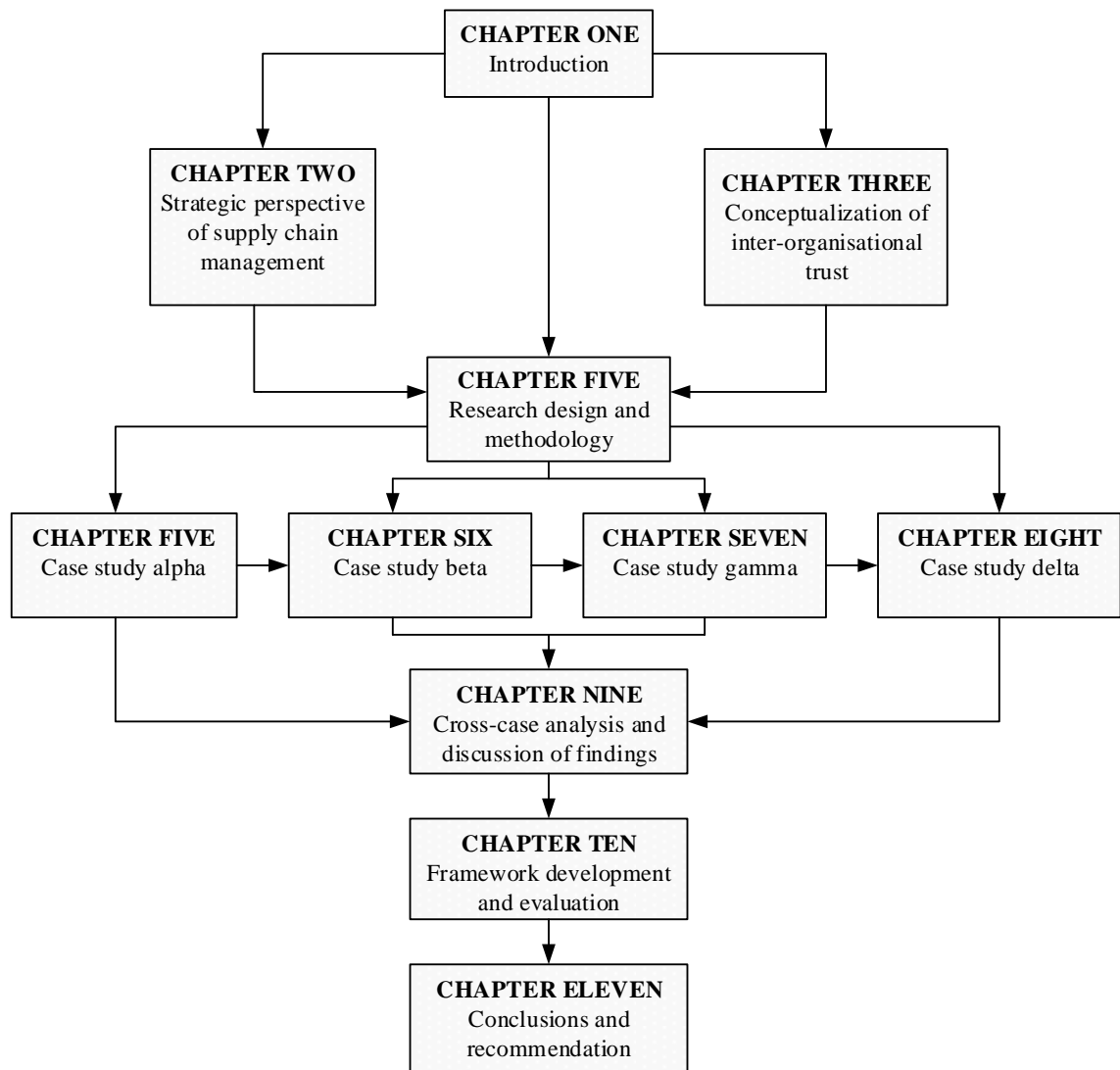


Figure 1.1 Thesis structure

Chapter 4: Research Design and Methodology

This chapter discusses and justifies the research design and methodology adopted for the study. The methods of data collection and analysis are also presented in addition to strategies that were implemented to ensure reliability and validity of the research. Strategies that were used to adhere to ethical requirements are also outlined.

Chapter 5: Case Study Alpha

This chapter presents findings of the first case study investigation and begins with an outline of the case study background before discussing findings from emergent themes structured

according to the research questions i.e. MC SCM practices, manifestation of trust in the MC's supply chain and functional consequences of trust in the MC's supply chain.

Chapter 6: Case Study Beta

This chapter presents the findings of the second case study investigation and follows the same structure as chapter 5.

Chapter 7: Case Study Gamma

This chapter presents findings of the third case study investigation and follows the same structure as chapter 5.

Chapter 8: Case Study Delta

This chapter presents findings of the fourth case study investigation and follows the same structure as chapter 5.

Chapter 9: Cross-Case Analysis and Discussion of Findings

This chapter presents a cross-case analysis that highlights similarities and differences across the four case studies. Discussion of these findings using extant trust and SCM literature is also undertaken in this chapter so as to delineate how emergent findings relate to previous research work.

Chapter 10: Framework Development and Evaluation

This chapter presents the framework that was developed based on the cross-case findings as well as accompanying recommendations. It also discusses feedback from the framework evaluation where perspectives were sought from selected participants on the framework and recommendations.

Chapter 11: Conclusions and Recommendations

This chapter presents the conclusion to the research by summarising the various steps taken to achieve the research objectives. Contributions of the study to theory, methodology and practice as well as practical implications are highlighted. The study limitations and consequent recommendations for further research finally outlined.

1.8 SUMMARY

This introductory chapter has presented the research background and provided justification for the study based on existing gaps in knowledge. The research questions, aim and objectives, study scope and research design have also been discussed before finally outlining the organisational structure of the thesis. The next chapter (Chapter Two) presents the first literature review on the strategic perspective of supply chain management.

CHAPTER TWO: STRATEGIC PERSPECTIVE OF SUPPLY CHAIN MANAGEMENT

2.1 INTRODUCTION

The previous chapter presented an introduction to the research. In this chapter, the concept of supply chain management (SCM) is explored from generic SCM and construction management literature. The emergence of SCM in the construction sector is discussed before presenting literature on the main features that could constitute strategic SCM practice. Benefits of strategic SCM practices especially as a strategy to collaboratively engage with firms further down the construction supply chain as well as improve upon the low-trust culture in the construction industry are highlighted. This chapter thus sets the stage for further exploration of the relationship between strategic SCM practices and inter-organisational trust dynamics in the construction supply chain. This chapter contributes to objective one of the research.

2.2 THE SUPPLY CHAIN MANAGEMENT CONCEPT

In this section, a historical overview of the SCM concept is presented with the aim of progressing towards a holistic definition of the concept. Based on these arguments, SCM is further discussed from operational and strategic perspectives.

2.2.1 Historical Overview and Definition

SCM is a concept that is widely regarded to have emerged from the fields of logistics and operations management (Cooper *et al.*, 1997) although some argue that its origins are unclear (Chen and Paulraj, 2004). During the 1980's, the need to offer lower costs, higher quality products and higher levels of customer service as a result of intense global competition resulted in the emergence of the SCM concept (Cooper *et al.*, 1997). The first

appearance of the term ‘supply chain management’ is thought to have been in 1982 (Oliver and Webber, 1982) where it was used to emphasise reduction in inventory both within and across firms (Cooper *et al.*, 1997). Prior to this period, manufacturers in the US had employed mass production in the 1950’s and 1960’s to reduce costs and improve productivity, and paid little attention to building supply chain partnerships. As manufacturing firms began to experiment with just-in-time (JIT) and total quality management (TQM) techniques as a means to improve quality, manufacturing efficiency and delivery in the 1980’s, the importance of strategic and cooperative supplier-buyer-customer relationships became more apparent as there was often little inventory to cushion scheduling and production problems.

The increasing trend towards market globalization, intensified competition, high inventory and logistics cost in the 1990’s further increased the need for improved quality, manufacturing efficiency and customer service. This promoted collaborative engagements between manufacturers and a selected number of high quality suppliers that jointly undertook product design and development activities, and cost, quality and service improvement initiatives. During this same period, business process reengineering (BPR) which entailed the redesign of business processes to reduce waste and increase performance had also began to gain popularity but then suddenly died down as it became synonymous with downsizing (Wisner *et al.*, 2011). It was at this stage that SCM rapidly gained popularity after its earlier emergence in the 1980’s, as a strategy for firms to gain competitive advantage. SCM has since continued to gain popularity in recent years due to a much globalized business perspective that is dominated by emphasis on time and quality-based competition alongside greater environmental uncertainty (Mentzer *et al.*, 2001).

Chen and Paulraj (2004) suggested that the SCM concept is often driven from different perspectives such as quality management, materials management and integrated logistics, industrial markets and networks and increased customer or stakeholder focus. These different directions perhaps account for the definitional vagueness of SCM, just like other ‘new management paradigms’ (Green *et al.*, 2005) such that despite its popularity in academia and industry, there are still diverse views about the concept (Cooper *et al.*, 1997; Mentzer *et al.*, 2001; Green *et al.*, 2005). Such misunderstandings are often reflected for instance in the constant confusion between logistics and SCM (Cooper *et al.*, 1997) whereby SCM is viewed as logistics outside of a firm (Wisner *et al.*, 2011).

Mentzer *et al.* (2001) have argued that there seems to be much more agreement amongst authors on the definition of supply chains as against SCM as a concept, and thus, understanding the term ‘supply chains’ presents a common platform from which to understand SCM. Supply chains are typically defined as network of organisations that are involved through upstream and downstream linkages, in the different processes and activities that contribute value in the form of a product or service delivered to an ultimate consumer (Christopher, 1992). Thus supply chains involve information and material flows across a network of organisations as shown in a generic manufacturing supply chain in Figure 2.1.

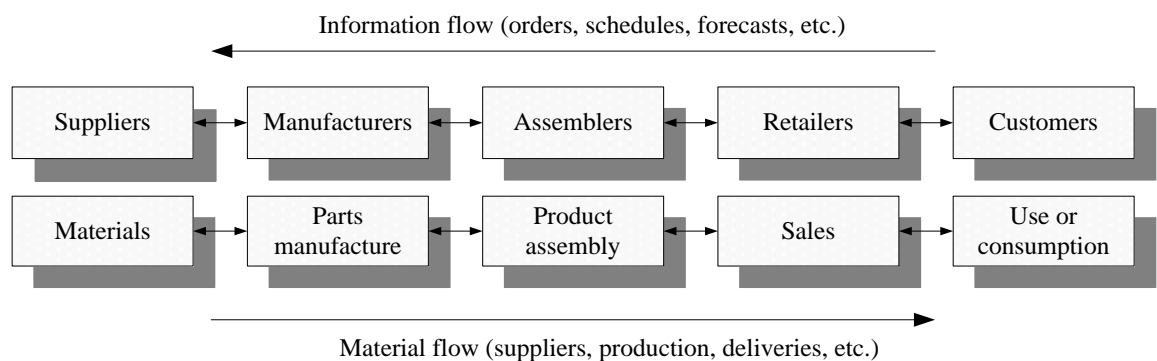


Figure 2.1: Generic configuration of a supply chain in manufacturing (Vrijhoef and Koskela, 2000)

SCM can thus be defined as an organisation's application of a management philosophy to coordinate these networks of upstream and downstream linkages between other organisations through exchanges of products, information or services with the ultimate aim of creating value for the client or customer (Christopher, 1992). As cited by Cooper *et al.* (1997), the International Centre for Competitive Excellence, currently known as the Global Supply Chain Forum, have also defined SCM as "*an integration of key business processes from end user through original product suppliers with the aim of providing products, services and information that add value for customers and other stakeholders*".

The above SCM definitions suggest that integrated logistics management is a narrower concept that is subsumed within the broader SCM concept given its focus on business process integration which also entails logistics as a business process. In addition to logistics management, business processes considered under SCM also entail information systems integration, planning and control activities, product design and development, research and development, and customer service management (Cooper *et al.*, 1997). SCM is thus primarily about integration of business processes to enable the supply chain react as one entity and enhance their long-term competitive advantage (Wisner *et al.*, 2011). Vrijhoef and Koskela (2000) also asserted that the basic idea which drives SCM is the recognition of interdependencies in the supply chain and therefore the need to improve its control and configuration through integration of business processes. Throughout generic and construction related SCM literature, the SCM concept is viewed as a strategy to enhance competitive advantage through the way firms utilize their suppliers' processes, technology and capability. This conceptualization of SCM has nonetheless resulted in two different perspectives: strategic and operational (see Ganeshan and Harrison, 1995; Cox, 1999; Green *et al.*, 2005).

2.2.2 The Operational Perspective of Supply Chain Management

The operational perspective of SCM dominates much of the literature as this is more related to the logistical foundations of the concept. The operational view focuses on logistical functions that comprise procurement of materials, transformation of these materials into intermediate and finished products and their distribution to end users or customers (Ganeshan and Harrison, 1995). This operational view has also been referred to by Bowersox *et al.* (2010) as constituting value addition to the supply chain process by carefully positioning inventory to achieve sales. This can help achieve competitive advantage through service benefits – reduced customer order times – and cost minimization. It entails integrated coordination of activities such as order management, warehousing and storage, demand forecasting, material handling and logistics communication (Stock and Lambert, 2001). Green *et al.* (2005) have also revealed that the focus of this aspect of SCM is on the realization of more efficient ways of managing the flow of goods, services and information across the whole supply chain. This is with the vision of drastically reducing inventories and effectively regulating the suppliers' interaction with the production line (Vrijhoef and Koskela, 2000).

It is this view of SCM that dominated much of the discussion by Vrijhoef and Koskela (2000) on the four roles of SCM in construction which are:

- To ensure dependable material and labour flows to site so as to avoid any disruption of workflow – focus on site activities.
- To reduce costs that relate to logistics, lead-times and inventory – focus on supply chains e.g. material and component suppliers.
- To transfer activities from the construction site to the supply chain so as to avoid technical difficulties as a result of site conditions or achieve concurrency between activities.

- To achieve integrated management and improvement of the supply chain and site production – focus on the supply chain and construction site.

This operational view of SCM thus encompasses mainly production and distribution functions as against strategic procurement management.

2.2.3 Strategic Perspective of Supply Chain Management

From a strategic viewpoint, firms position themselves in such a way that they can achieve quality, customer service and competitive success (Tan *et al.*, 2002). This positioning is driven by the power circumstance that surrounds a firm within the supply chain (Cox and Ireland, 2002) and strategic relationships are developed for the primary reason of value appropriation (Green *et al.*, 2005). This competitive positioning of firms by developing strategic relationships based on the power differences over time has been less dominant in SCM research in comparison with the operational perspective. This present study is therefore positioned within the strategic SCM perspective which would thus dominate much of the following discussions as well as the empirical phase of this research.

2.3 EMERGENCE OF SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION

SCM, which as discussed earlier originated from the manufacturing sector as part of the proliferation of JIT, TQM (Saad *et al.*, 2002; Wisner *et al.*, 2011) and BPR approaches (Wisner *et al.*, 2011) has gradually gained some prominence in the construction sector. The changing competitive environment of construction meant that the sector would start to learn and implement ideas from other industries especially manufacturing (Tookey *et al.*, 2001). Similar to the emergence of SCM in the manufacturing sector, its adoption in construction has been a gradual build up from the adoption of JIT, TQM and partnering approaches as strategies for improving effectiveness in the construction delivery process (Saad *et al.*, 2002). This gradual evolution of SCM in construction has also been attributed to reform

pressures on the industry towards alternative and innovative methods and systems that can increase productivity (Morledge *et al.*, 2009).

The progression towards SCM in construction can also be tracked to evolution of procurement approaches between the 1960's and 2000's as well as how such evolutionary changes have influenced relationship types (Saad *et al.*, 2002). Since the early nineteenth century, construction was dominated by traditional single-stage procurement which was characterised by short-term and adversarial relationships, fragmented processes and tightly compartmentalized functions and roles (Saad *et al.*, 2002). However, alternative forms of procurement began to emerge in the 1960's in response to changing client needs (Edum-Fotwe *et al.*, 2001). These proactive changes to procurement were mostly driven by well informed and experienced construction clients (Tookey *et al.*, 2001) and alternative approaches such as two-stage tendering, construction management, management contracting and design and build (D&B) have since emerged through such client-driven improvement efforts. These procurement approaches often require re-configuration of relationships, roles and power differentials in the construction supply chain. Project-specific partnering in the 1980's and strategic-type partnering in the late 1990's - where the focus was on cultivating long-term business relationships – continued to signal further progression towards SCM in construction (Saad *et al.*, 2002).

In the UK construction industry, a significant landmark in this evolutionary process was the 'Building Down Barriers' initiative by the UK Ministry of Defence (MOD) which demonstrated the shift towards best value approaches (Holti *et al.*, 1999; Cain, 2004). Two pilot projects were awarded to prime contractors AMEC and Laing in 1997 as an initiative to establish working principles of supply chain integration in construction. The aim was to set up long-term relationships that could improve value and quality, reduce underlying costs

and promote trust, openness and teamwork for all concerned. The MOD's approach to construction procurement here placed emphasis on supply chain integration and single point responsibility (Potts, 2008).

SCM gained further prominence in the industry as it increasingly became apparent that a multi-factor, system-based approach was required to effectively and efficiently manage complex supply chain networks so as to gain competitive advantage in an increasingly globalised economy through cost reduction and higher productivity (Vrijhoef and Koskela, 2000). This need for a system-based approach to management in construction is also linked to the complex nature of supply chains in construction and some shortcomings of previous collaborative efforts. These are now described in the following sections.

2.3.1 The Nature of Supply Chains in Construction

The supply chain structure of the construction industry, unlike the manufacturing sector is much more complex given that a typical construction project involves a network of interactions between production suppliers, demand organisations and in-use suppliers that span across different tiers as shown in Figure 2.2.

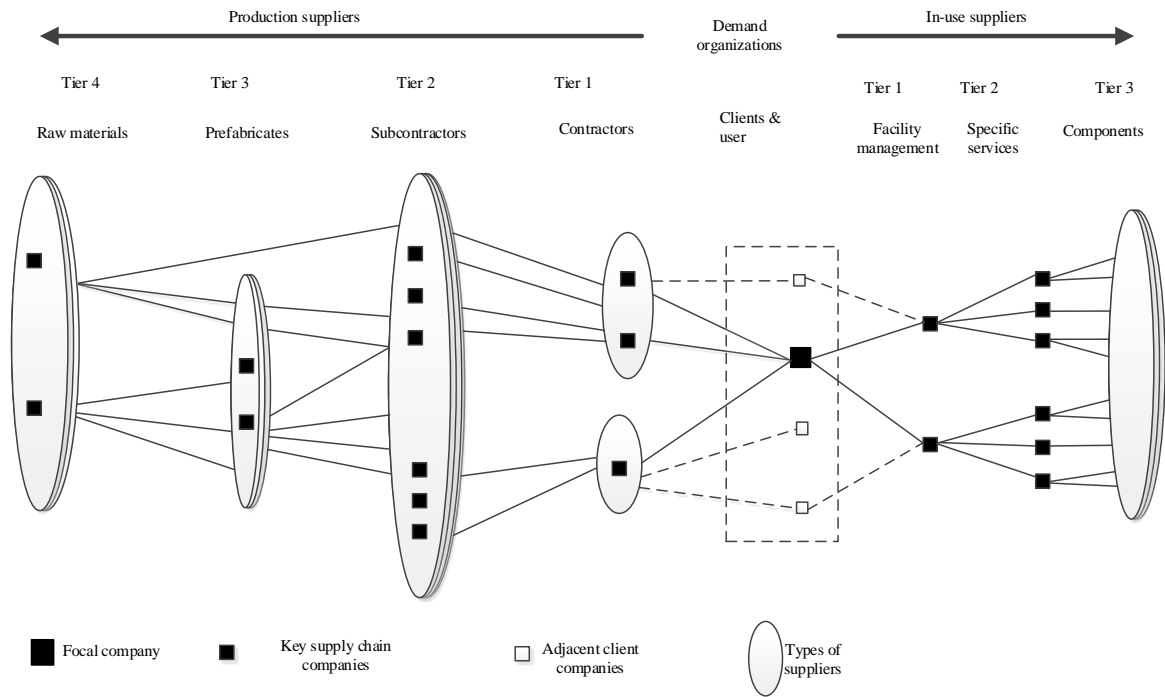


Figure 2.2: Construction project supply chain structure (ammended from Ronchi, 2006)

In the UK construction sector for instance, few MCs and a large number of SCs constitute production suppliers. There has thus been a proliferation of large number of small firms and self-employed workers that depend, through subcontract agreements, on relatively fewer large MC firms for work.

Data from the Office for National Statistics (ONS) Construction Statistics Annual 2013 revealed that in the third quarter of 2012, 17.3% of UK construction firms had a sole proprietor, 36.7% employed only one person and a further 25.1% employed a maximum of three people. Only 2.1% employed more than 25 people as shown in Figure 2.3. Whilst some large firms - particularly M&E contractors - work as SCs under a main contract, it is undeniable that the small-to medium-sized businesses (SMEs) remain the driving force of the UK construction industry through subcontracting practice.

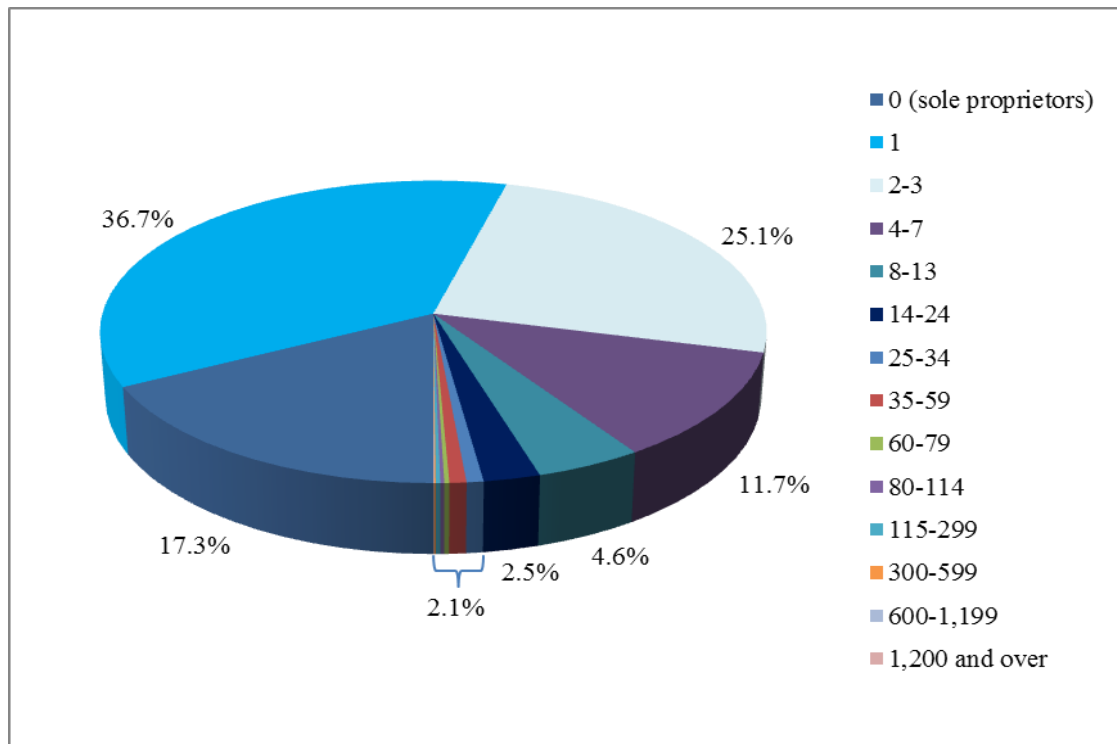


Figure 2.3: Size distribution of UK construction for 3rd Quarter, 2012 (Data source: Office for National Statistics, 2013)

2.3.1.1 Subcontracting in Construction Industry

Vrijhoef and Koskela (2000) discussed the need for a shift from traditional approaches of controlling construction supply chains as this had become inadequate due to the reality that MCs were increasingly reliant on other actors in the chain (e.g. suppliers and SCs) for their labour and materials which typically constitute about 75-90% of construction work by value (Chiang, 2009; Hartmann and Caerteling, 2010; Eriksson and Westerberg, 2011). This entrenched nature of subcontracting in the construction industry is also as a result of the specialist nature of some construction works (Yik *et al.*, 2006). Specialist SCs are usually required particularly for building services works. However, beyond the need to subcontract specialist aspects of construction works, more generalized works such as reinforced concrete works, brickwork and interior works are subcontracted in a similar manner as a strategy to operate efficiently and to cope with variable work demands. Winch (1998)

revealed that the growth in labour-only subcontracting in the British construction industry resulted from the strategic choice by construction companies to emphasise flexibility over productivity as a source of competitive advantage.

Manu *et al.* (2013b) summarised the reasons for subcontracting practice in construction as follows:

- The ability to fine-tune labour flexibility;
- The ability to bargain down labour cost;
- To encourage quicker completion of tasks;
- The ability to externalise less rewarding and dangerous activities;
- The transference of financial risk;
- The ability to meet changing product market demands;
- The avoidance of workers' compensation cost; and
- The ability to rapidly meet changing product market demands.

Although subcontracting in the construction industry has contributed to organisational and managerial flexibility as well as the provision of specialized services, it has also been associated with the lacklustre performance of the industry (Chiang, 2009). Multi-layered subcontracting practice is reported to be a major cause of poor quality and health and safety (see Ankrah, 2007; Manu *et al.*, 2010b; Manu *et al.*, 2013b). Factors such as inefficient communication, subcontractor insolvency, and substandard work quality all need to be addressed (Yik and Lai, 2008) as these influence the successful completion of construction projects. A system-based rather than linear approach is required to manage these complex networks of supply chains. It is for these reasons and the need to increase productivity that the construction industry has embraced a number of supply chain initiatives (Vrijhoef and Koskela, 2000).

2.3.2 Shortcomings of Previous Collaborative Efforts

Arguably, collaborative efforts in construction have focused mostly on the client - contractor interface with limited attention on integrating SCs and suppliers into such working arrangements (Arditi and Chotibhongs, 2005; Karim *et al.*, 2006; Bresnen, 2009). Kumaraswamy *et al.* (2010) have revealed that failing to integrate SCs, suppliers and consultants into collaborative framework agreements has been one of the key shortcomings of recent collaborative efforts such as partnering. This inability to fully integrate SCs and suppliers into partnering and alliance type arrangements in the construction sector seems to have fuelled more interest in SCM as a system-based platform for collaboratively engaging with not just upstream, but most especially downstream firms that constitute the construction supply chain. It is for such reasons that perhaps Walker (2007) described SCM as a partnership-style arrangement that trickles down to SCs and suppliers in a manner which makes it possible for them to contribute to design, programming and other areas of collaboration. Two strategic SCM implementation modes have been revealed in construction management literature.

2.4 SUPPLY CHAIN MANAGEMENT IMPLEMENTATION IN CONSTRUCTION

The implementation of SCM in the construction sector has not been coherent, with different clients, contractors, consultants and specialist contractors often displaying different forms of SCM behaviour to meet their various needs. SCM is therefore claimed to be poorly understood in the construction sector although it still promises enormous performance improvement benefits (Akintoye *et al.*, 2000; McGeorge *et al.*, 2002). The two broad forms of strategic SCM implementation that have emerged in the construction sector are the client-centric and contractor-centric SCM models (King and Pitt, 2009).

2.4.1 Client-centric Supply Chain Management Model

The client driven SCM implementation model has attracted wider attention in construction management literature (see for example Briscoe *et al.*, 2004; King and Pitt, 2009; Rimmer, 2009) probably because construction appears to be the only industry where client requirements dictate the organisation and management of production (Tookey *et al.*, 2001). Thus, emphasis is often placed on the need for client leadership in successful SCM implementation (Rimmer, 2009). Large construction clients that have regular workloads and a greater power leverage to extract value from contractors (Walker, 2007) enter into relationships with the ultimate aim of value appropriation (Green *et al.*, 2005) as shown in Figure 2.4.

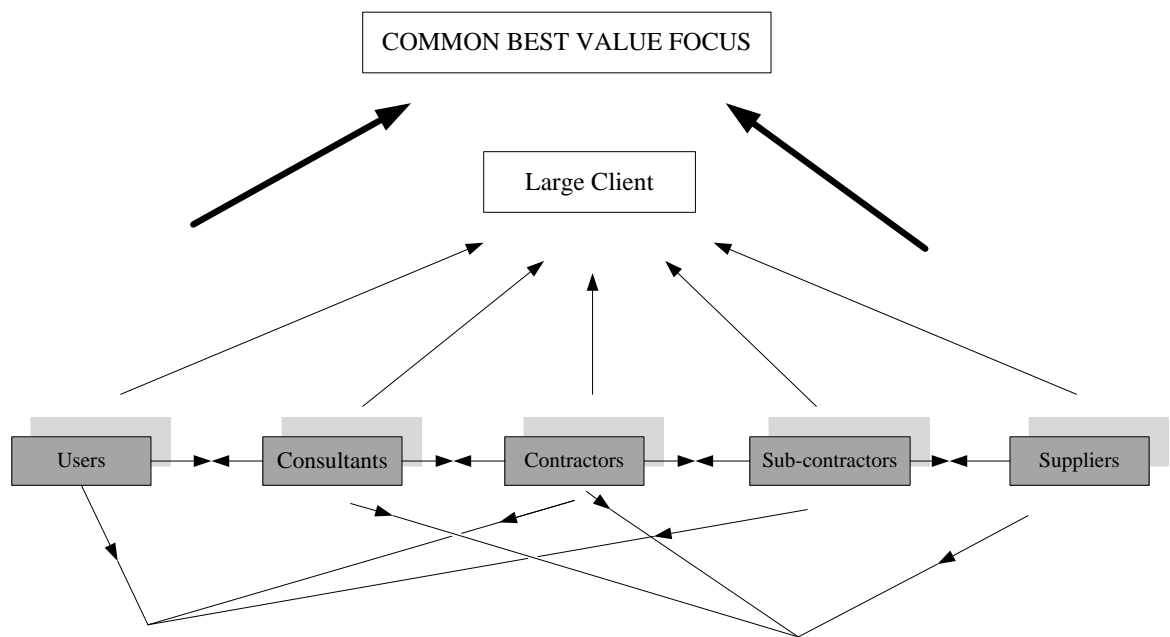


Figure 2.4: Client-centric supply chain management model (Kumaraswamy *et al.*, 2010)

This mode of SCM implementation can be seen in megaproject situations such as the BAA Terminal 5 project and the London Olympics project where the client organisations had the necessary workloads that made it possible for them to enact their own SCM strategy. These supply chains have also been referred to as project-based supply chains as firms are brought together and managed for a one-off project spanning a considerably long period of time.

2.4.1.1 British Airport Authority (BAA) Terminal 5 Project

BAA's £4.3 billion Heathrow terminal 5 (T5) project has often dominated client-centric SCM discussions. This mega-project - which involved roads, rail, buildings and systems - consisted of 16 projects, 147 sub-projects and 1,500 work packages (Doherty, 2008). BAA acted as a project manager rather than a client by taking legal responsibility for the project risks (Potts, 2009). They managed 150 first-tier suppliers using their unique T5 agreement (Doherty, 2008). BAA had earlier worked with 60 first-tier suppliers that were responsible for their own SC engagements but having recognised the inadequacy of this approach, they gradually engaged directly with 2000 third-tier suppliers, 5000 fourth-tier suppliers and over 15,000 fifth-tier suppliers and five principal contractors so as to make the supply chain feel part of the T5 experience. Overall, the T5 project involved 20,000 companies and a 50,000 strong workforce with approximately 6,000 of them involved on the project at any given time (Doherty, 2008).

Through the T5 agreement: a commercial contract that focused on cause rather than effect and the realisation of integrated project teams, BAA was involved directly in managing and mitigating risk, governance, supplier performance management, dispute resolution, understanding and managing supplier motivations and final account closures. The integrated supply chain that resulted from BAA's direct approach to managing the supply chain resulted in a project that was delivered safely, on time, and on budget (Doherty, 2008). BAA was therefore an intelligent, well-informed and hands-on client (Doherty, 2008) that led in areas typically the domain of supplier and contractor organisations (Wolstenholme *et al.*, 2008).

2.4.1.2 London Olympics Project

The Olympic Delivery Authority (ODA) had the primary responsibility of delivering venues and infrastructure for the 2012 London Olympic and Paralympic games on time, to budget and as fit for purpose. To achieve this, the ODA, which maintained strict oversight of the delivery process, appointed a delivery partner called CLM (comprising CH2M Hill, Laing and Mace). CLM was not part of the design and construction supply chain but instead a partner responsible for providing specific skills and resources that the ODA lacked i.e. managing the construction programme, supply chain and contract management of contractors' day-to-day operations and risk management (Jacobson, 2011). The delivery structure is illustrated in Figure 2.5.

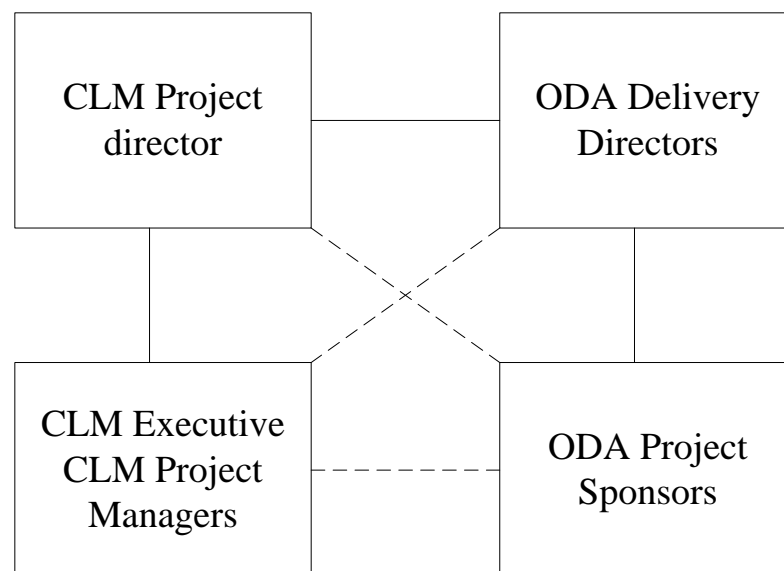


Figure 2.5: ODA's delivery management matrix (Jacobson, 2011).

CLM was responsible for leading and managing the supply side of the construction including SCM. The NEC3 contract form was used across the supply chain to promote an environment of mutual trust and cooperation as a key principle of the contract. The ODA and CLM also worked together to establish appropriate governance structures and reporting regimes that evolved as the programme progressed. The ODA's direct suppliers for

construction and engineering work packages comprised approximately 150 tier one contracts and 7,500 tier two contracts.

Tier one contracts were established with MCs that merely subcontracted to tier two contractors and subsequently coordinated the physical delivery. The whole supply chain comprised over 43,000 contracts. The ODA had a SCM team that supported procurement and award of tier one contracts, were responsible for establishing suitable supply chains, measuring, monitoring supplier capacity and financial standing and insolvency management during procurement and throughout contract delivery.

2.4.2 Contractor-centric Supply Chain Management Model

Though the BAA Terminal 5 project and the ODA's Olympic park project have been discussed above as successful examples of client-driven SCM implementation, very few construction clients can generate such repeat demands required to sustain their own project-based SCM. This client-centric model of SCM implementation which dominates much of the construction management research literature is therefore arguably less representative of the bulk of annual construction activity in the UK. Its implementation is also likely to be stronger between the client and first tier contractors with lesser potential for the client to properly coordinate issues further downstream within the supply chain. King and Pitt (2009) have therefore suggested that MCs with sufficient economic and organisational size have the potential to make SCM a reality in the construction sector. Here, a reputable contractor enacts an SCM strategy that is used to provide common best value focus to one-off or on-off clients as shown in Figure 2.6.

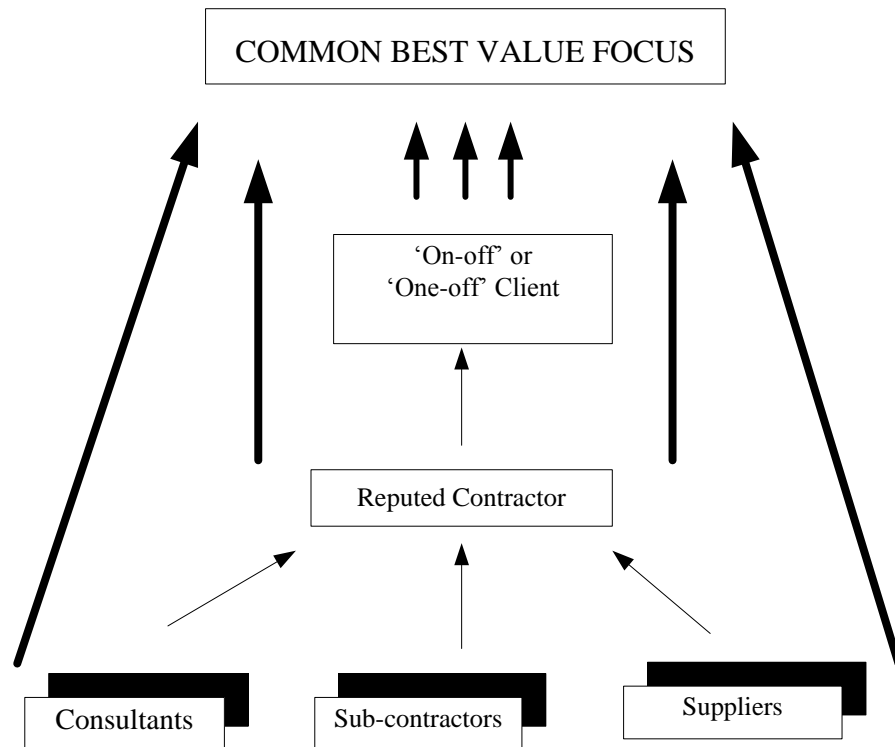


Figure 2.6: Contractor-centric supply chain management model (Kumaraswamy *et al.*, 2010)

Recent trends towards integration and relationship development in the UK construction industry have presented MCs with opportunities to increase their role in the market by managing a greater number of stakeholders so as to facilitate collaborative working (Karim *et al.*, 2006; Smyth, 2010). This has led various UK MCs to adopt and enact their own SCM strategies for managing SCs and suppliers. This mode of SCM implementation is described as the management of an organisational supply chain that spans a series of projects as against a single project. Yet, this contractor-centric model has received limited empirical research attention (King and Pitt, 2009). This situation thus creates an opportunity for new research into the operation of contractor-centric SCM implementation which will be the thrust of this research.

2.5 SUPPLY CHAIN MANAGEMENT FEATURES AND MATURITY MODEL

This section discusses SCM features from generic SCM and construction management literature so as to progress towards actual implementation practices. A SCM maturity model is then discussed in section 2.5.2. This would provide the basis for tracking SCM maturity based on the extent of implementation of these SCM features. Thus, findings from the empirical phase of this present work would help to delineate progress towards strategic SCM adoption in the construction sector.

2.5.1 Supply Chain Management Features

The different practices that constitute SCM from a more strategic perspective are still evolving and thus, usually a subject of debate (Mentzer *et al.*, 2001). Through synthesis of SCM literature; different features have emerged as constituting SCM practice from a strategic viewpoint. These are: 1) supply chain orientation; 2) supply base management; 3) supply chain performance measurement; 4) continuous performance improvement; 4) information technology; 5) supply chain finance and 6) long-term relationships.

2.5.1.1 Supply Chain Orientation

Mentzer *et al.* (2001) emphasised that the implementation of SCM begins with an acknowledgement by management of a company that there are implications for strategic and systemic management of upstream and downstream flow of services, finances, products and information across their suppliers and customers. The earlier stages of SCM implementation therefore commences when a firm that is well placed to coordinate upstream and downstream processes implements certain actions or structures to formally coordinate interactions with other businesses so as to ultimately derive value additions for the customer or end user.

2.5.1.2 Supply Base Management

Firms seek to reduce engagement with marginal or poor performing suppliers whilst increasing spending with their top-performing suppliers. This supply chain rationalization or optimization process whereby buyers engage with fewer suppliers contributes to benefits such as reduced prices, fewer supplier management problems, closer and more frequent interaction and greater quality levels and delivery reliability as only the best suppliers remain on the supply base (Wisner *et al.*, 2011). Ronchi (2006) also revealed some set of variables that deal with policies related to the supply chain base management. These variables were supply base size, connection degree, and internal classification of supply base members according to their features. Wisner *et al.* (2011) further suggested that it is prudent for firms to continuously restructure their supply base by demoting poor performers whilst optimizing its size so that greater levels of supply performance would be achieved. There have also been suggestions for firms to diversify their supply base so as to manage any risk of failure due to crises that could arise from a single supplier (Wisner *et al.*, 2011). Rational management of this tension is necessary for effective supply base management.

2.5.1.3 Supply Chain Performance Measurement

Supply chain performance has broadly been measured according to responsiveness and efficiency of supply chain firms and these often entail the use of metrics on customer service, internal efficiency, demand flexibility and product development (Hugos, 2011). Stock and Lambert (2001) expressed the view that literature rarely focuses on supply chain performance due to the difficulty to quantify and establish common performance standards – arising from differences amongst supply chain members that make it difficult for comparisons using a single measure. Similarly Cheng *et al.* (2010) and Halman and Voordijk (2012) have claimed that despite its importance, the performance of supply chains has not received much attention in construction management literature

To overcome the difficulty of establishing common performance standards for instance, researchers have proposed the alignment of supply chain performance measures to key supply chain business processes. The widely accepted Supply Chain Operations Reference (SCOR) model which was introduced by the Supply Chain Council (SCC) in 1996 is often applied to supply chain performance measurement in different sectors. This model, which is based on five key business processes' i.e. plan, source, make, deliver and return, is hierarchically structured into four levels, with each providing an increased degree of detail. The SCOR model is also accompanied by 524 performance metrics that fit into the categories of responsiveness, reliability, agility, costs and asset management (Fronia *et al.*, 2008; Wisner *et al.*, 2011). As an example of its application also in construction, Cheng *et al.* (2010) have developed a performance monitoring framework based on the SCOR model using M&E processes during a construction project as a reference point. Performance metrics such as process cycle time, timeliness of product, product conditions upon arrival and documentation accuracy were selected, all of which fed into the supply chain responsiveness category.

The balanced scorecard (BSC) approach to supply chain performance measurement which was developed by Robert Kaplan and David Norton in 1992 (Kaplan and Norton, 1992) has also been applied to align performance measures of organisations to their strategic plans and goals. The balance scorecard framework consists of four perspectives i.e. financial perspective, customer perspective, internal business perspective and learning and growth perspective. These perspectives are then linked together through performance measures for each of the four areas. Some companies have not only applied the BSC in measuring the performances of their supply chains, but have also developed web-based 'reverse scorecards' to obtain constructive feedback from their suppliers (Wisner *et al.*, 2011). This

BSC approach has also been adapted to develop measures of supply chain performance in the construction sector (see for e.g. Kagioglou *et al.*, 2001; Halman and Voordijk, 2012).

For maximum benefits, performance data should be displayed in formats that support business intelligence not just at the strategic level where it helps top management decide what to do, but also at the tactical level – to help middle management decide how to do it – and at the operational level – to help people actually do it (Hugos, 2011). By evaluating the performance of suppliers and SCs during the project delivery process for instance, MCs can identify those with exceptional performance and those that require assistance as well as any potential risks that need to be carefully managed. This underscores the need to understand and perhaps improve how MCs measure performance across the construction supply chain.

2.5.1.4 Continuous Performance Improvement

The competitive performance of the supply chain value stream is dependent on learning and development in the supply chain (Hayes, 2007). The evaluation of supplier performance based on mutually agreed performance measures can provide opportunities for continuous improvement (Wisner *et al.*, 2011). These performance improvements can also be linked to the unprecedented force of sustainability and building information modelling (BIM), which are reshaping the future of construction project delivery (see Cassidy, 2003; Aranda-Mena *et al.*, 2009; BIS, 2011; Barlish and Sullivan, 2012; Kibert, 2012; BIS, 2013a). The need for gradual reconfigurations to work ethics, company principles and the project delivery processes require that all firms that contribute to the project delivery process progress continuously in the same direction in achieving industry aspirations. Delivering projects that meet BIM and sustainability visions are likely to be the basis of future competitive advantage in the UK construction industry. Thus, the ability of MCs to enhance their long-term competitive advantage in the market could depend largely on how together with their

supply chains; they can move their frontiers in terms of sustainability improvements and BIM project delivery. Given these various construction industry agendas, continuous performance improvement (CPI) efforts could be used to promote such initiatives across the supply chain.

Continuous performance improvement efforts are however inhibited by several factors. Bessant *et al.* (2003) have posited that during inter-firm learning, the lead organisation often drives the supply chain down a given route which may influence the extent to which supply chain firms can contribute towards the improvement of processes. Typically, SMEs are often not included in the decision making and planning processes for them to make any meaningful contributions towards process improvements (Bessant *et al.*, 2003). This present study would seek to explore what improvement initiatives are used to drive any particular CPI efforts and how this can be enhanced by supply chain involvement to ensure long-term competitive advantage of the MC's supply chain as a single entity.

2.5.1.5 Information Technology

Information is paramount to making strategic SCM decisions and as such, information technology (IT) has become a central SCM feature. Lönngren *et al.* (2010) argued that IT plays a central role in construction SCM because it facilitates consistent and efficient management of information. Cheng *et al.* (2001) presented an e-business infrastructure for construction which encompasses resource planning, teamwork, process improvement tools and techniques, information management, training and development. Gunasekaran and Ngai (2004) highlighted the role of IT in supporting virtual enterprises, e-commerce and knowledge management so as to realise effective SCM. The bulk of literature on IT in SCM however relate to its use in supporting supply chain integration and collaborative networks such as business-to-business (B2B) and business-to-consumer (B2C) e-commerce, e-

procurement and virtual logistics (see for e.g. Clarke, 1998; Kaplan and Sawhney, 2000; van Hoek and Chong, 2001; Gunasekaran and Ngai, 2004).

According to Gattorna and Walters (1996), computer-based information systems are required to have four characteristics which comprise data retrieval, data assembly, data analysis and report generation. Data retrieval is the capability to recall data in its basic form whereas data assembly is the capacity to transform data to information by restructuring into different formats. Data analysis is an extension of data assembly where data from different sources can be synthesised into a particular model to optimize strategic supply chain decision making. These computer-based information systems are thus required to ensure that data can be transformed to information and subsequently intelligence that can support management's supply chain decision making. Intelligence provided by the IT system should not only support top management supply chain decision making but also decisions by middle management and people at the operational level (Hugos, 2011). Overdependence on information technology systems can however have a detrimental effect on an organisation as there is the tendency that bottom level employees could become disconnected from the decision making aspects of their job roles. There is therefore scope to investigate how IT is used to support information management and supply chain decision making within a focal construction organisation as this has implications for strategic SCM implementation.

2.5.1.6 Supply Chain Finance

The global financial meltdown that emerged in 2008 and its consequent strain on SME cash flows have made management of supply chain finances a vital aspect of SCM practice. An economic recession presents increased risk of collapse for most SMEs especially in the construction sector as they are often faced with high premiums from their creditors, high cost of short-term debt finance, high banking charges and reduced overdraft facilities, all of

which translates into shortage of working capital, suboptimal production and eventual collapse (Ma and Lin, 2010). Empirical evidence has however revealed the positive effects of effective working capital management on SME profitability during recessions whereby firms that are able to reduce their number of account receivable days and shorten cash conversion cycles improve profitability in a recession (García-Teruel and Martínez-Solano, 2007). Reverse factoring and dynamic discounting are two supply chain finance mechanisms (see for e.g. Klapper, 2006; Hurtrez and Salvadori, 2010; Tanrisever *et al.*, 2012) that have emerged as strategies for overcoming SME cash flow challenges by seeking to reduce number of account receivable payment days.

Reverse factoring is a collaborative arrangement whereby a large corporation that has a higher credit rating compared to an SME arranges with a bank to advance cash payments to the SME earlier than the agreed 'account receivables' day after invoice approval. By sharing invoices on an information system, suppliers and SCs (SMEs) can access 'account receivables' earlier than the agreed 'account payables' date (see Figure 2.7) as the bank would advance payment at an interest rate that is based on the corporations (buyers) borrowing rate rather than that of the supplier. The corporation then pays the bank at the end of the agreed 'account payable' date which can then amount to cheaper financing for the supplier who would otherwise have to depend on external finance at higher premiums. The benefits are that rather than typical 20-30% interest rate premiums for instance, an SME could just pay an interest rate of about 2-3%. This is an administrative charge for receiving agreed invoice payments earlier than the account payable days agreed between the buyer (MC) and supplier (SC).

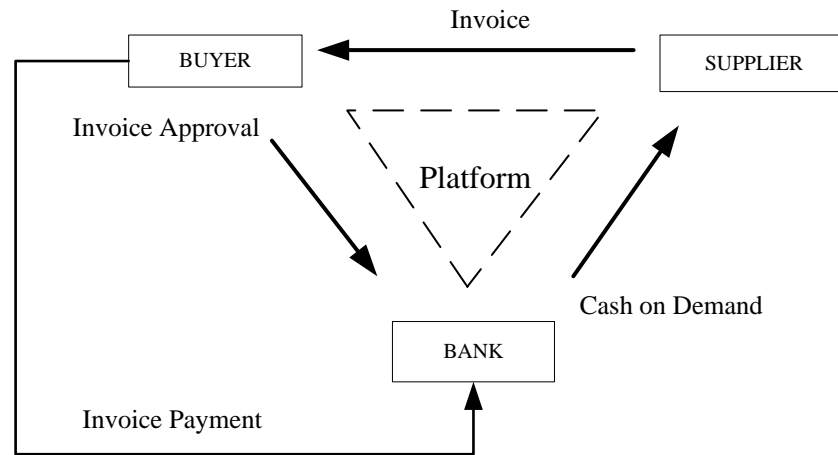


Figure 2.7: Reverse factoring mechanism (Tanrisever *et al.*, 2012)

The major advantage then with reverse factoring is that high-risk suppliers can leverage and thus benefit from the creditworthiness of their high-quality low-risk buyers (Klapper, 2006). Some UK construction giants are already piloting such early payment schemes after a lobby by the UK Prime Minister's Office in October 2012 for SME support through reverse factoring. The roll out of reverse factoring has dominated recent news albeit with some controversies. Recent UK news headlines such as 'More major contractors consider following Carillion's lead on early payment facility' (Mair, 2013b), 'Carillion to expand controversial early payment facility' (Mair, 2013a), 'Interserve rejects supply chain finance' (Fitzpatrick, 2013) and others (see Gardiner, 2013b; Gardiner, 2013a; Hurst, 2013) highlight this controversy.

Without downplaying the benefits of reverse factoring as a source of cheaper finance for the supply chain, it could compound problems for SMEs if not properly structured. An unintended consequence is that it could promote the very late payment culture that it aims to prevent as large corporations are likely to – as part of arrangements – extend their payment terms based on arguments that early payment can be received from the bank for very small interest charges.

Dynamic discounting is a supply chain finance programme that is self-financed by the buyer (MC) which thus takes out any intermediary cost to the bank as in the case of reverse factoring. Rather than small interest payments to banks with reverse factoring, dynamic discounting entails negotiations between a buyer (MC) and seller (SC) whereby little discounts are given by the seller so that invoice payments are made earlier than the agreed account payable date. This discount of say 2% could provide the seller (SC) with working capital that is cheaper than external short-term finance with premiums in the regions of 20-30% and beyond for an SME. This supply chain finance strategy however requires close collaborations with supply chain SCs so as to arrive at arrangements that provide them with cheaper short-term working capital at a discount that yields a win-win outcome for both the MC and SC. There is thus the need to explore the implementation of these supply chain finance initiatives by UK MCs and the impacts these have on ensuring a financially healthy construction supply chain.

2.5.1.7 Long-term Supply Chain Relationships

Effective supply chains are fundamentally alliances between cooperating firms. Hugos (2011) emphasised that unless there is a longer time-frame of supply chain relationships, there would be little incentive for firms to make the necessary efforts or invest time and resources into such strategic relationships. There would even be limited opportunity to work together in improving supply chain efficiency through continuous learning. Yet, the development of strategic supply chain relationships has been linked with the degree of interdependence (Gattorna and Walters, 1996). As far as there is a high dependence on either the part of the buyer or the supplier, the strategic response is for the highly dependent party to build longer term relationships with the less dependent party. Gattorna and Walters (1996) further argued that strategic partnerships are not appropriate when there is low dependence on the part of both the buyer and supplier. The manner in which such long-term

supply chain relationships are established in the MC's supply chain and the nature of these interdependencies are worth exploring.

2.5.2 Supply Chain Management Maturity Model

Lockamy III and McCormack (2004) developed an SCM maturity model based on the relationship between business process maturity and the SCOR. This maturity model entails five stages of progression in activities towards effective SCM and process maturity. These five maturity stages as shown in Figure 2.8 are ad hoc, defined, linked, integrated and extended.

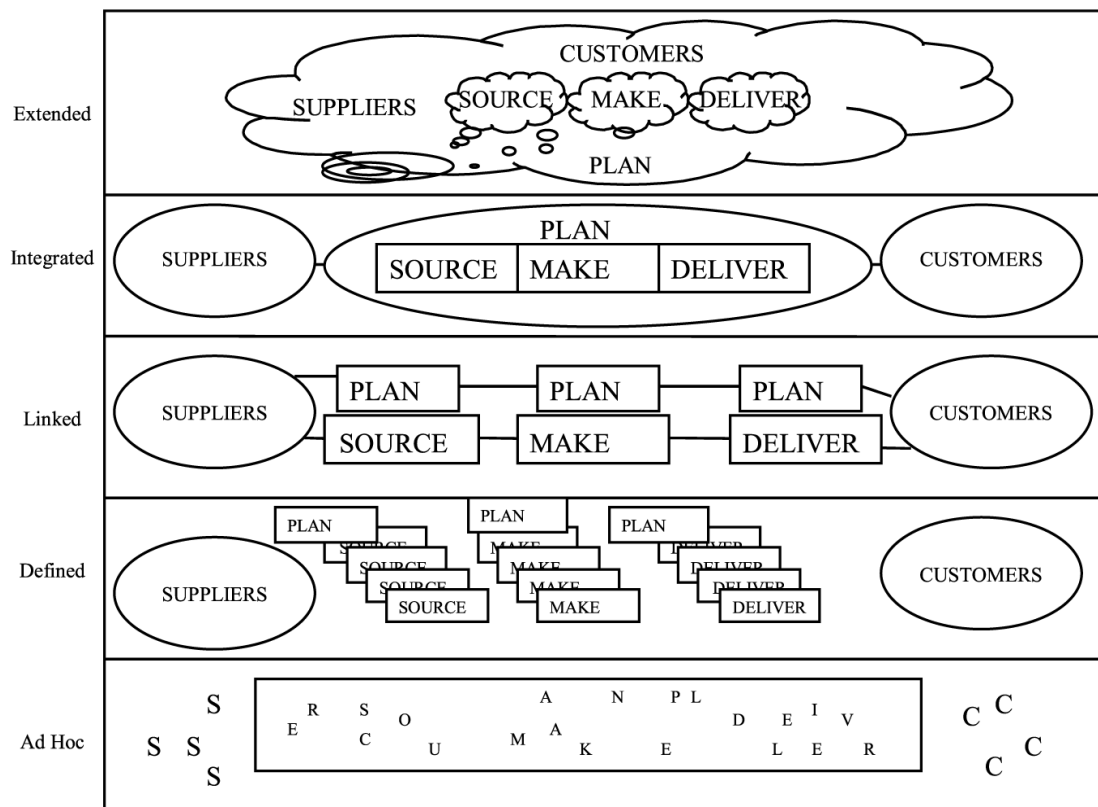


Figure 2.8: Supply chain management maturity model (Lockamy III and McCormack, 2004)

At the ad hoc level, the supply chain and its practices are unstructured and ill defined, there are no process measures in place, jobs and organisational structures are not based on horizontal supply chain processes and process performance is unpredictable. Even when

targets are defined, they are often missed, SCM costs are high, customer satisfaction is low and functional cooperation is also low. At the defined level, the basic SCM processes are defined and documented whereas jobs and organisation still remain traditional. Process performance becomes more predictable although defined targets are frequently missed; SCM costs remain high and customer satisfaction is still low albeit with some recent improvements.

At the linked level which Lockamy III and McCormack (2004) refer to as the breakthrough level, SCM is employed with strategic intent and broad SCM jobs and structures are established outside of traditional functions, common SCM measures and goals that reach horizontally across the supply chain begin to emerge, process performance becomes more predictable and targets are often achieved. Continuous improvement efforts take shape, SCM costs begin to decrease and customer satisfaction begins to show remarkable improvements.

As a further build up from the linked level, the integrated stage takes cooperation to the process level where organisational structures and jobs are based on SCM procedures, traditional supply chain related functions disappear, SCM measures and management systems are deeply entrenched and advanced SCM practices such as collaborative forecasting and planning with customers and suppliers become the norm. At this stage, process performance is predictable, targets are reliably achieved, SCM costs are dramatically reduced and high levels of customer satisfaction and *esprit de corps* translates into competitive advantage.

At the extended stage, competition is based on multi-firm supply chains and responsibilities are easily transferrable across different legal supply chain entities due to advanced SCM

practices; common processes and goals amongst multi-firm SCM teams emerge and trust, mutual dependency and *esprit de corps* become the glue that hold the extended supply chain together. Also, a horizontal, customer-focussed collaborative culture is established, process performance and reliability of the extended system is measured and investments are jointly made towards system improvements in addition to joint sharing of any returns.

This supply chain maturity model has been employed as an analysis framework to investigate SCM process performance and overall business performance in relation to SCM maturity in the product manufacturing sectors (Lockamy III and McCormack, 2004). However, SCM maturity in the construction context has not been empirically investigated especially within the context of contractor-driven SCM where UK MCs have for some years implemented some SCM principles.

2.6 RESEARCH GAPS IN CONSTRUCTION SCM PRACTICE

The research gaps from the above discussions are summarised in this section as: 1) the limited empirical insights into contractor-driven SCM implementation in construction and 2) influence of SCM practices on inter-organisational trust development in construction.

2.6.1 Limited Empirical Insights into Contractor Driven SCM

Supply chain management has been adopted by various UK clients and MCs, yet Lönngren *et al.* (2010) have claimed that while there is growing SCM literature in construction management domain, there is limited empirical evidence that provides practical examples of managing supply chains in this area. This claim is much truer for contractor-driven SCM implementation as existing literature often focusses on client-driven SCM (King and Pitt, 2009).

Thus, there are still pertinent questions about the extent to which MCs have implemented the SCM features discussed above and how these have so far contributed to benefits in construction project delivery. These questions include:

- Which of these practices require more focus, which can be discarded and which ones can be further entrenched?
- Again, where in the SCM maturity model can the MC's supply chain be positioned based on existing practices?

The adoption of SCM has also been associated with numerous benefits, the most prominent of which is to develop competitive advantage in a globally challenging environment (Fronia *et al.*, 2008). Since SCM is about business process integration that enables the supply chain to react as one entity and enhance long-term competitive advantage, to what extent have the SCM practices implemented by MCs contributed to the realization of industry initiatives such as BIM and sustainable project delivery amongst other MC in-house initiatives?

2.6.2 Influence of SCM Practices on Inter-organisational trust Development

Many authors have conceptualised trust as an antecedent to successful SCM implementation or practice (Mentzer *et al.*, 2001). This antecedent view of trust in relation to SCM has also featured in construction related SCM literature (Akintoye *et al.*, 2000; Green *et al.*, 2005; Rimmer, 2009; Lönngren *et al.*, 2010). Rimmer (2009) particularly posits that in construction, professionals and consultants are typically trusted whereas MCs and SCs are mistrusted. This was highlighted as an important barrier to SCM implementation in construction. Morledge *et al.* (2009) have also argued that the short-term nature of construction projects, transient nature of project teams, lack of trust, adversarial relationships and a high number of infrequent clients are the main problems that inhibit successful SCM implementation in construction. Green *et al.* (2005) also made similar

arguments about differences in structure of the construction industry and its low-trust nature relative to the high-trust aerospace sector where SCM has been successfully applied.

Whilst acknowledging the importance of trust as an antecedent factor for successful SCM implementation, the influence of SCM on inter-organisational trust development has not received as much empirical research attention (Chen and Paulraj, 2004) especially in construction. La Londe and Masters (1994) have emphasised that supply chain strategy comprises two or more firms that enter into a long-term agreement for the sake of developing trust and commitment in the relationship. Although trust development in construction has been described as a daunting task (Wong *et al.*, 2005), the following piecemeal suggestions have been presented in construction management literature as strategies for improving trust across the supply chain:

1. Providing better alignment of incentives through the use of more collaborative procurement approaches can improve calculative forms of trust (Laan *et al.*, 2011a);
2. Co-location, frequent informal interactions, increased transparency through shared administrative systems for recording project events can improve trust through psychological sources (Laan *et al.*, 2011a);
3. Communicating openly and effectively improves trust (Wong *et al.*, 2005);
4. Increased performance by displaying problem-solving ability and competence of work can improve trust (Wong *et al.*, 2005);

5. Lower focus on price and authority and the use of informal social control e.g. usage of collaborative tools, self-policing as a means of performance evaluation, joint objectives and profit sharing (Eriksson and Laan, 2007) can promote trust;
6. Use of contracts underpinned by fairness principles e.g. NEC3 contracts where early warning signals are provided to clients in a spirit of mutual trust and cooperation (Gerrard, 2005; Klimas, 2011; Rowlinson, 2011).

Yet improvements in inter-organisational trust in the construction industry through these efforts outlined above have been rather marginal and there is still the scope for inter-organisational trust to be promoted in an integrated manner using SCM as a strategy. From the foregoing arguments, trust should not just be viewed as a pre-requisite or antecedent of effective SCM implementation but also as a consequence such that its adoption can be used as a strategy to promote inter-organisational trust across the supply chain. The improvement of low trust levels in the construction sector as a result of SCM adoption therefore requires further research attention especially in the context of the much weaker downstream relationships between MCs and SCs. There is also the need for a framework that can guide construction practitioners on how to engender inter-organisational trust using SCM as a strategy as well as instances where MCs should place emphasis on different aspects of their SCM practice so as to stimulate particular dimensions of trust.

2.7 SUMMARY

The historical evolution of SCM in the manufacturing sector and a more complete definition of the concept have been presented before including a discussion of the operational and strategic SCM perspectives. Given that the thrust of this study is the strategic perspective of SCM, the emergence of SCM in construction and the industry-related challenges that have

necessitated its adoption have been discussed from a strategic viewpoint. It was argued here that the client-centric SCM model dominates much of the construction management literature as against the contractor-centric model and hence the need for further empirical insights.

Furthermore, some features of strategic SCM have been discussed from generic SCM and construction management literature and then subsequently linked to a SCM maturity model. It was however argued that the extent to which these and any other SCM related features are implemented by MCs require exploration so as to provide a vivid account of progression towards SCM adoption within this context. It was also argued that although trust can be both an antecedent and consequence of SCM implementation, the antecedent view has received much empirical research focus in construction management as against the potential for SCM to serve as a system-oriented strategy for improving or even managing inter-organisational trust levels in the supply chain. This study therefore focuses on the interaction between SCM practices and inter-organisational trust in the contractor driven SCM context. To progress further from this premise, the next chapter (Chapter Three) discusses the concept of inter-organisational trust and its functional consequences.

CHAPTER THREE: CONCEPTUALIZATION OF INTER-ORGANISATIONAL TRUST

3.1 INTRODUCTION

The previous chapter discussed strategic aspects of SCM and its emergence in the construction sector. It was argued that trust could either be an antecedent to effective SCM implementation or a consequence of SCM adoption, although the latter has arguably received limited empirical attention. In this chapter, the concept of inter-organisational trust is discussed as a complex multi-dimensional and elusive construct that is considered fundamental to explaining business behaviour in organisational contexts. First, trust is defined from different theoretical and academic perspectives with the aim of providing a holistic and integrated view of the concept. The factors that influence trust dynamics and its functional consequences in inter-organisational relationships are also explored from both mainstream as well as construction management literature. Efforts aimed at promoting trust-based collaborative relationships in construction are also reviewed. The chapter is summarised by highlighting the paucity of and existing gaps in inter-organisational trust research in construction management. This chapter contributes towards the achievement of research objective two.

3.2 CONCEPTUALIZATION OF TRUST

To contribute towards an integrated conceptualization of trust from different theoretical and academic perspectives, it is prudent to define trust as well as discuss concepts such as trust attributes, subjects and objects of trust, trustworthiness and trustfulness, interpersonal and inter-organisational trust and modes of trust production.

3.2.1 Definitions of Trust

Trust has been described as elusive both in theory and practice (McKnight and Chervany, 1996; Gambetta, 2000; Atkinson and Butcher, 2003). This has contributed to different definitions, confusions about its antecedents and outcomes and even a lack of clarity in the relationship between trust and other related constructs such as risk and control (see Das and Teng, 2001; Mayer *et al.*, 2007). To develop an integrated perspective of trust in inter-organisational relationships (IORs), there is the need to understand the widely divergent theoretical persuasions that have often emerged in trust literature. Sabel (1993) defined trust as “*the mutual confidence that no party to an exchange would exploit the other’s vulnerabilities*”. Trust has also been defined as “*commitment to an exchange even when there is uncertainty that the opposite party would reciprocate*” (Coleman, 1994). Gambetta (2000) defined trust as “*the level of subjective probability with which an agent assesses that another agent or group would perform a particular action to their favour irrespective of their ability to monitor or control such actions*”.

The definition that features most prominently in literature is that trust is “*a psychological state that enables a party to accept vulnerability based on positive expectations in the intentions or behaviours of other parties*” (Rousseau *et al.*, 1998; Das and Teng, 2001; Dekker, 2004; Costa and Bijlsma-Frankema, 2007; Mayer *et al.*, 2007; Weibel, 2007). Although most of these definitions assert the subjective and psychological nature of trust, there exist similarities and differences which have implications for understanding trust in relation to other related constructs. These different definitions reveal the acceptance of vulnerability in situations of uncertainty as a recurrent theme. Most of the definitions also suggest that trust is just the psychological state of having positive expectations rather than an action although the definition by Coleman (1994) seems to suggest that trust is a commitment. It is however agreed that trust is that psychological expectation which triggers

vulnerability acceptance rather than a direct action *per se*. Thus in the absence of risk and uncertainty and without a party's acceptance of vulnerability, the relevance of trust would be lost (Murphy, 2006).

Another issue that gives rise to differences in trust definitions concern the factors that underpin the formation of positive psychological expectations. Some authors (e.g. Holton, 1994; Lewicki *et al.*, 1998; Hieronymi, 2008) have emphasised that the psychological state required for trust can be founded on either faith or on a belief that a party's word or promise can be relied upon. However, in more rational situations, trust can be founded on the perceived benefits or losses that could be derived from trusting decisions (Gambetta, 2000) although from a philosophical viewpoint, Hieronymi (2008) argued that such reasons for trust that concern the value, importance or necessity of a trusting response are weaker. Hieronymi (2008) argued that the extent to which a party must rely, for justification or motivation of their trusting response, on reasons that appeal, to that same extent their response was not fully trusting.

Another difference in trust definitions is with regards to the limit that is placed on the presence or absence of control and monitoring. Gambetta (2000) and Mayer *et al.* (2007) qualified their definition of trust by emphasising that the acceptance of vulnerability is irrespective of the ability to monitor or control the other party. Such a qualification seems to suggest that trust is a belief that goes beyond control and enforcement whereby a trusted party would not act opportunistically even if there exists any material incentive (Woolthuis *et al.*, 2002). Williamson (1993) however did not impose any such restriction on their notion of trust as they posited that contracts, punishments and rewards could be designed to engender trust. From the foregoing arguments, it is clear that whereas trust is agreed to be a psychological expectation that entails the acceptance of vulnerability based on expectations

of others' behaviour or conduct, questions still remain regarding factors that underpin the formation of such psychological expectations.

3.2.2 Attributes of Trust

Trust has been associated with numerous attributes such as confidence, reliability, dependability, credibility, fairness, goodwill, honesty, competence, integrity, benevolence and predictability (see for e.g. Ganesan, 1994; Aulakh *et al.*, 1996; Doney and Cannon, 1997; Zaheer *et al.*, 1998; Young-Ybarra and Wiersema, 1999; Dyer and Chu, 2000; Mayer *et al.*, 2007). However, three broad parsimonious trust attributes have often emerged in the literature (see Mayer *et al.*, 2007) as: 1) competence or ability, 2) integrity and 3) benevolence. These are also similar to Shaw's (1997) model of trust which identifies three attributes: 1) achieving results, 2) acting with integrity and 3) demonstrating concern.

3.2.2.1 Competence

Competence or achieving results is a party's ability to perform their role successfully based on possession of skill and knowledge necessary for effective task performance (Laan *et al.*, 2011a). This attribute cannot be generalised across dissimilar tasks or situations where a party is not known to have demonstrated proven performance (Mayer *et al.*, 2007). Das and Teng (2001) also argued that competence is more calculus-based and can originate from a firm's reputation for successful performance as well as their available resource capabilities e.g. physical properties, technology, human resources, capital, and market power. Das and Teng (2001) also linked competence with performance risk as a party's high competence increases their probability of successful task performance.

3.2.2.2 Integrity

Integrity describes that aspect of trust which is based on the belief that a party feels moral obligation and responsibility to act in the interest of a relationship above their own individual interest even when there is an incentive for opportunism (Das and Teng, 2001). It has also been described as a trustor's perception that a trustee would act in accordance with principles that are acceptable to the trustor (Mayer *et al.*, 2007), suggesting that the trustee would have to be aware of principles that are considered acceptable by the trustor in any exchange relationship.

Integrity trust can also be likened to intentional trust (Laan *et al.*, 2011a) which concerns the extent to which a trustee intends to use their ability to conform to the trustor's expectations without behaving opportunistically. Wong *et al.* (2000) also related integrity to honesty, consistency, keeping promises, fairness, predictability, openness, honouring commitments, reliability, dependability, responsibility and benevolence although some of these are classified as stand-alone attributes in other studies. Das and Teng (2001) have linked integrity trust to relational risks in exchange relationships since this attribute is concerned with a party's good faith and good intentions irrespective of their high competence.

3.2.2.3 Benevolence

Benevolence is the extent to which a trustee is believed to do 'good' without any egocentric benefit or profit (Mayer *et al.*, 2007). The display of benevolence without any egocentric benefit is however highly contested as this could still be motivated by immediate or long term benefits that one may anticipate or envisage during economic transactions (Nooteboom, 1996). It was further argued by Nooteboom (1996) that even when acting out of an emotional bonding of love without any external motives or extrinsic utility,

benevolence could still be motivated by an underlying ‘emotional utility’ that still amounts to an egocentric benefit although in this instance intrinsic. Nevertheless this attribute of trust seems to entail the demonstration of some goodwill.

3.2.3 Subjects and Objects of Trust

The subjects of trust (trustors) are imperatively human actors as non-humans cannot accept vulnerability or feel betrayal (Sztompka, 1999; Hieronymi, 2008). The objects of trust (trustees) are however not as distinct and can vary in complexity. Can the object of trust be non-human? Hieronymi (2008) argued that directing trust towards non-human entities amounts to mere reliance as the trustor can only experience disappointment rather than feel betrayed when positive expectations are not met in such circumstances. Sztompka (1999) further explained that although trust can be directed towards non-human objects e.g. cars, computers or other equipment, the actual underlying objects of trust in such circumstances are the human creators of these products. Thus, the real objects of trust are the human actors linked to the functioning of such non-human entities. Objects of trust can also be as simplistic as people who are known from one-to-one interactions; may take the form of social objects to which there are no personal interactions e.g. politicians, celebrities and television presenters; may be an organisation, group of individuals or third party (secondary) social actors such as credit rating agencies, professional and certification bodies; and referees who attest to the trustworthiness of other parties (see Sztompka, 1999).

In the construction sector, the object of trust from a client’s perspective could be the main contractor’s project team, head office personnel or both. In main contractor (MC) – subcontractor (SC) relationships that are characterized by use of highly transient project gangs, the question then arises as to what constitutes the actual object of trust from both MC and SCs perspectives. Clearly, a comprehensive exploration of what constitutes the exact

object of trust at any given time during IORs in construction could present implications for understanding the trust development process. This distinction between the subject and object of trust also has implications for the conceptual difference between trustfulness and trustworthiness as these are attributes that relate to the object and subject of trust respectively. The conceptual difference between trustfulness and trustworthiness (discussed in the next section) could contribute to trust development efforts during projects by revealing where emphasis should be placed i.e. the subject (trustor) being more trustful or the object (trustee) being more trustworthy.

3.2.4 Trustfulness and Trustworthiness

Although there are conceptual differences between trust and trustworthiness (Hardin, 2007), claims about trust are often confused with trustworthiness because some researchers fail to make a clear distinction between the two constructs (Weibel, 2007). Trustworthiness is a component of trust that relates to the personal attributes of a trustee (object of trust) such as their credibility, benevolence, competence and integrity (Mayer *et al.*, 2007). Trustfulness is an aspect of trust that relates to the personal attributes or traits of the trustor (subject of trust) which accounts for the ease or difficulty with which they trust (willingly accept vulnerability) (Tullberg, 2008). Trustfulness, which is also described by Mayer *et al.* (2007) as a trustor's propensity, is thus a personality trait. This could derive from an individual's early psychological development (Lee and Turban, 2001) such that if trust has consistently been rewarded than betrayed in one's life over a considerable period of time, it creates the tendency for that individual to become more trustful (becomes rooted in their personality) independent of the trustee's trustworthiness (Sztompka, 1999).

From the trustor's viewpoint, trustworthiness is more epistemological in nature as this derives from acquiring information that demonstrates the credibility, competence or

integrity of a trustee. According to Hardin (2007), merely displaying a trusting response without the necessary consideration of trustworthiness does not entail any benefits as this could be severely detrimental to an exchange relationship. To ascertain trustworthiness, a trustor consciously or unconsciously undertakes cognitive assessments before demonstrating willingness to accept vulnerability. Hardin (2007) argues that making any claims of a psychological dimension to trust that is in anyway different from a cognitive, rational or calculative (epistemological) dimension may be misdirected. This argument was to the effect that a trustor's expectation would usually be underpinned by what is known about the past reputation or future of the trustee, hence any subjective differences in trusting behaviour - given the same incentives (potential objective payoffs) - becomes a question of available knowledge.

Trust game experiments by Fetchenhauer and Dunning (2009) however support the presence of irrationality in trusting responses as some evidence showed that when there was clearly adequate knowledge to necessitate trusting little, some participants went on to trust too much. This again raises questions about the factors that underpin the display of positive psychological expectations i.e. is it the degree of trustworthiness of the trustee, trustfulness of the trustor, potential pay-off at stake or simply a leap of faith? This notwithstanding, there is the need to understand how both constructs (trustfulness and trustworthiness) unfold during construction contracting as well as where emphasis should be placed with regards to improving inter-organisational trust during projects.

3.2.5 Interpersonal and Inter-organisational Trust

Roehrich and Lewis (2010) pointed out the importance of distinguishing between interpersonal and inter-organisational trust. Interpersonal trust involves trust between individuals of contracting organisations that develops based on close interactions and

personal ties (Kale *et al.*, 2000). Zaheer *et al.* (1998) further explained that interpersonal trust concerns the extent to which a boundary-spanning agent trusts in their counterpart from another organisation. Inter-organisational trust on the contrary, is that which the member of a focal organisation places in a partner organisation (Zaheer *et al.*, 1998). Fang *et al.* (2008) distinguished between intra-entity trust, agency trust and inter-organisational trust using the schematic illustration in Figure 3.1. Agency trust according to Fang *et al.* (2008) is that which each firm has in their own representatives. The intra-entity trust (interpersonal trust) is that which derives from interpersonal interactions during a contractual relationship and inter-organisational trust is that which develops between the collaborating firms.

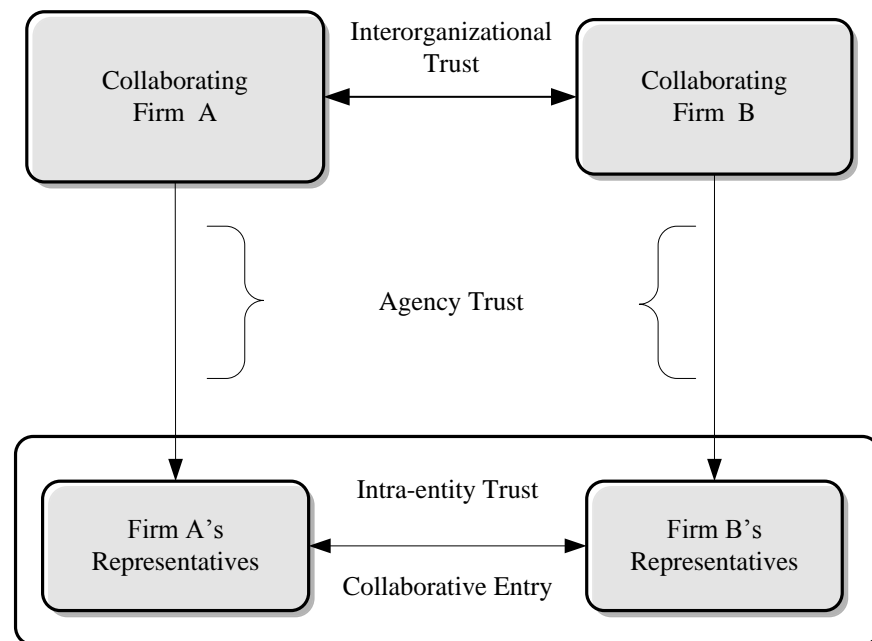


Figure 3.1: Interpersonal and inter-organisational trust (Fang *et al.*, 2008)

Trustors could either repose trust in individual organisational representatives at strategic or operational levels. This gives rise to what Janowicz and Noorderhaven (2006) described as strategic and operational levels of inter-organisational trust depending on who the trustor is and who is being trusted as shown in Figure 3.2. When the trustee is a top-level personnel

in an organisation, it amounts to strategic-level trust whereas trusting an operational level personnel would amount to operational-level trust.

		Who is trusted ? (i.e. trustee)	
		Individual	Organisation
Who trusts? (i.e. trustor)	Individual	Top-level INDIVIDUAL → INDIVIDUAL / ORGANISATION Strategic-level trust	
		Operational-level INDIVIDUAL → INDIVIDUAL / ORGANISATION Operational - level trust	
	Organisation	ORGANISATION → INDIVIDUAL	ORGANISATION → ORGANISATION

Figure 3.2: Strategic and operational levels of inter-organisational trust (Janowicz and Noorderhaven, 2006)

From Janowicz and Noorderhaven's explanation, trust can either be an interpersonal phenomenon between two individuals, an individual trusting an organisation or between two organisations. Yet, even the trust between two organisations is arguably a reflection of trust in their individual representatives at either strategic or operational levels. This is particularly relevant in temporary project organisations such as in construction where highly transient project teams represent their organisations at the project level. Laan *et al.* (2011a) and Lau and Rowlinson (2009) thus emphasised the importance of interactions between interpersonal and inter-organisational trust in construction contracting. Individual actions at the project level for instance have been claimed to be starting mechanisms for inter-organisational trust development (see Munns, 1995; Lau and Rowlinson, 2009) especially

when such individuals possess high levels of authority and responsibility within their organisations (McDermott *et al.*, 2004).

Bachmann and Inkpen (2011) have further expressed the view that inter-organisational trust is a phenomenon that can be realised from both micro-level face-to-face contacts or macro-level institutional safeguards. They posited that advanced socio-economic systems can hardly rely on micro-level sources (face-to-face interpersonal interactions) of trust creation alone as macro-level (institutional) sources are required to compensate for instances where it becomes inefficient to develop repeated face-to-face contacts. Thus despite the importance of interpersonal trust as a source of inter-organisational trust (Zaheer and Harris, 2005; Laan *et al.*, 2011b), the role of institutions in trust creation requires deeper empirical insights so as to develop practically relevant management knowledge (Bachmann and Inkpen, 2011). The foregoing arguments suggest that although interpersonal and inter-organisational trust are somewhat different constructs, interpersonal interactions and institutional arrangements are two important factors that are critical to the development of inter-organisational trust.

3.2.6 Modes of Trust Production

The dimensions of trust based on their sources have given rise to two apparently contradictory theoretical traditions (Laan *et al.*, 2011a). The first tradition is the economic perspective where trust is viewed as calculated risk that entails rational evaluations, emphasising the extrinsic value of trust. The second tradition reflects psychological and sociological perspectives where trust derives from social orientation towards others, emphasising its intrinsic value. Researchers such as Rotter (1967) viewed decisions to trust as rooted in individual personality differences that regulate trusting decisions. Bhattacharya *et al.* (1998) argued that whereas such psychological perspectives are preoccupied with the

influence of individual differences regardless of variations in situational factors, other disciplines such as sociology, economics and philosophy have mostly disregarded variability in individual trust propensities.

Some scholars (e.g. Rousseau *et al.*, 1998; Möllering, 2001; Tullberg, 2008) have sought to unify these different traditions by acknowledging that trust is a complex and multidimensional construct that derives from both rational and extrinsic factors as well as psychologically oriented intuitive factors. Mayer *et al.* (2007) proposed an integrated model of trust that derives from extrinsic factors of perceived trustworthiness (associated with the object of trust) and intrinsic issues related to the trustor's propensity (associated with the subject of trust) as shown in Figure 3.3. From Mayer *et al.*'s proposition, it is evident that neither the trustor's propensity to trust nor the factors of perceived trustworthiness (ability, benevolence and integrity) as described in section 3.2.2 can be ignored when considering how trust is produced.

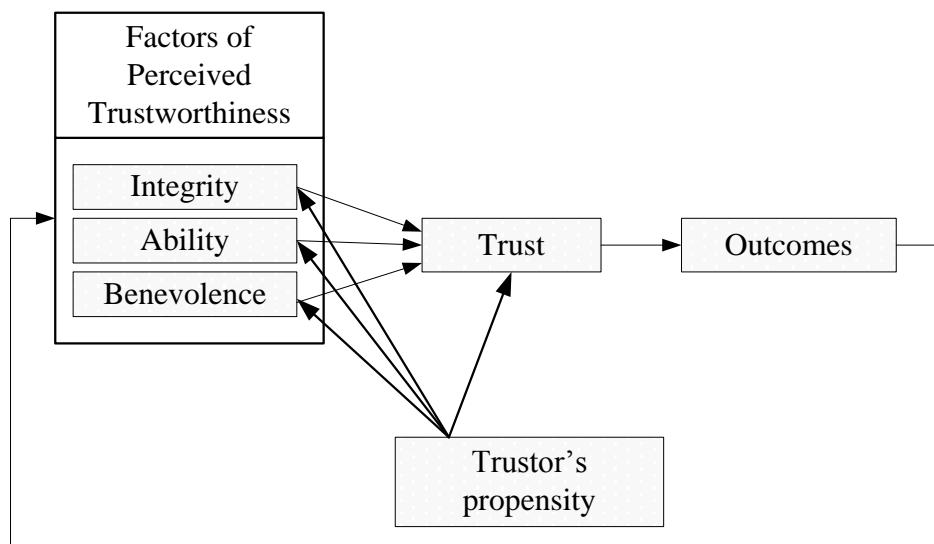


Figure 3.3: An integrative model of organisational trust (Adapted from Mayer *et al.* 2007)

This is perhaps the reason for which Rousseau *et al.* (1998) described trust as a complex multi-faceted and 'meso' concept that integrates micro-level psychological and sociological

processes with macro-level institutional arrangements. This ‘meso’ nature of trust suggests that to fully understand its modes of production, psychological and sociological processes as well as other contextual or institutional arrangements should be taken into account (see Bachmann and Inkpen, 2011). Three modes of trust production have often emerged in literature (see Kadefors and Laan, 2007; Wong *et al.*, 2008) to reflect this ‘meso’ nature of trust. These are: 1) cognition-based trust; 2) systems-based trust and 3) relational-based trust. These dimensions of trust, based on their derived sources are illustrated in Figure 3.4.

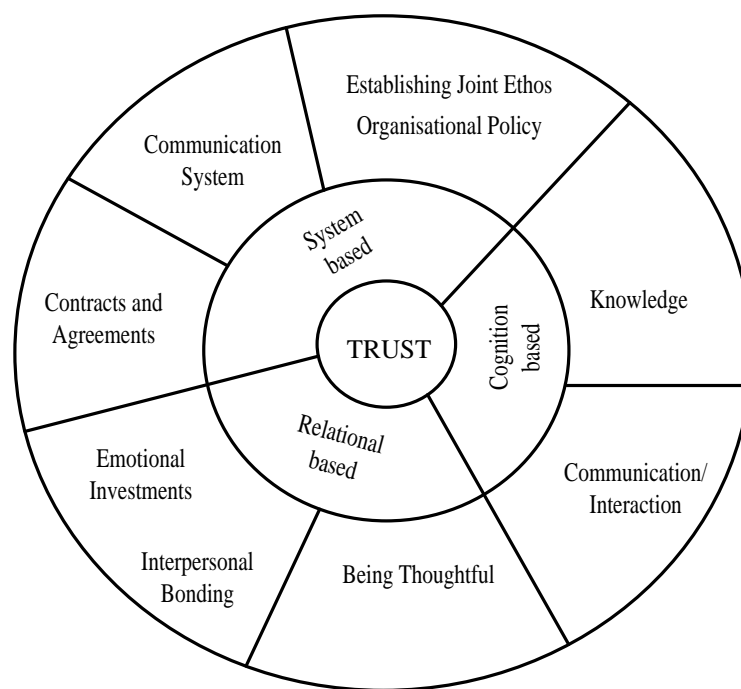


Figure 3.4: Dimensions of trust based on sources (Adapted from Wong *et al.*, 2008)

3.2.6.1 Cognition-based Trust

Cognition-based trust is described as the primary origin of trust in IORs particularly in situations where prior repeated interactions or history is absent (Kadefors and Laan, 2007). Cognition-based trust is rational and knowledge driven (Woolthuis *et al.*, 2002; Johnson and Grayson, 2005; Kadefors and Laan, 2007; Wong *et al.*, 2008). It derives from the assessment of a trustee’s trustworthiness by obtaining information about their credibility, reputation and competencies (Rousseau *et al.*, 1998), or assessing the likelihood of self-

interest behaviour based on the level of interdependency, short-term gains or future exchange prospects (Kadefors and Laan, 2007). Similar calculative or calculus-based views are also provided by Williamson (1993) and Nooteboom (1996), who have argued that the acquisition of credible trustee information, deterrence mechanisms, potential benefits and losses are all foundational to the willingness to accept vulnerability in exchange relationships.

Wong *et al.* (2008) suggested in their trust framework that knowledge, communication and interactions are paramount for the development of cognition-based trust during construction contracting. Trust at this level is however *ex ante* as it is impersonal and devoid of previous relational experience (Kadefors and Laan, 2007) although the trustor's historical experiences can influence the reflexive process of knowledge acquisition and interpretation. This dimension of trust is also subject to issues such as bounded rationality and information asymmetry (Coricelli *et al.*, 2002; Kahneman, 2003) which makes purely cognition-based dimensions of trust relatively fragile in nature. This dimension of trust, which is more related to development of confidence in a party's competence (Johnson and Grayson, 2005), has thus been described as 'thin or weak trust' (Kadefors and Laan, 2007; Ngowi, 2007).

3.2.6.2 System-based Trust

System-based trust emerges from contextual characteristics such as contractual agreements, contracting environment, cultural and societal norms as well as what is known to constitute ethical behaviour in a given business environment i.e. norms of practice (Dekker, 2004; Kadefors and Laan, 2007). Laan *et al.* (2011a) also echoed somewhat similar views that systems-based trust is linked to extrinsic factors such as formal contractual rules and monitoring. It has also been described as the set of formalized procedural arrangements that facilitate trust development by generating the necessary communication channels between

contracting parties (Roehrich and Lewis, 2010; Cheung *et al.*, 2011). This form of trust would therefore be dependent on the institutional framework or context within which business relationships are constituted. Most significantly, system-based trust is not just about physical co-location and situational context, but also the degree to which organisations are bound together in relations or norms of common socio-economic interests and goals (Murphy, 2006).

System-based trust, also sometimes referred to as institutional-based trust (Rousseau *et al.*, 1998; Dekker, 2004; Kadefors and Laan, 2007) has also been classified as the socio-structural perspective of trust (Reed, 2001; Murphy, 2006), reflecting its organisational and sociological nature. Thus, strategies that are implemented at the institutional level to ensure that common synergy is achieved e.g. off-site away day workshops, contracts (Roehrich and Lewis, 2010), joint training programmes and joint planning of tasks could all contribute to the emergence of systems-based trust during construction contracting. This viewpoint is supported by Wong *et al.*,’s trust framework where it is argued that communication systems, contracts and agreements are sources of system-based trust during construction contracting. Kadefors and Laan (2007) further describe system-based trust as ‘thin trust’ as it can still emerge without any prior relationship or exchange. Systems-based trust is thus concerned with the realisation of an environment where the potential for opportunism is reduced; thereby increasing the trustor’s potential to demonstrate trustfulness.

3.2.6.3 Relational-based Trust

Relational-based trust originates from repeated interactions and exchanges that evolve as inter-organisational relationships are projected into the future. Information about trustworthiness in this instance is thus available to the trustor from within the relationship (Rousseau *et al.*, 1998). Relational-based trust is conceptually similar to affect-based trust

(Johnson and Grayson, 2005; Wong *et al.*, 2008) which is argued to originate from emotional bonding and thoughtfulness between the trustor and trustee - built on a sentimental platform (Cheung *et al.*, 2011). Johnson and Grayson (2005) explained that trust at this level is characterized by feelings of security and perceived strength of the relationship given that as emotional connections deepen, trust in a partner ventures beyond that which is justified by available knowledge. This form of trust has thus been described as ‘thick’ or ‘strong’ trust (Murphy, 2006; Kadefors and Laan, 2007) as it is rooted in interpersonal relationships that have evolved over a period of time.

Relational-based trust therefore reflects meso-level trust (Rousseau *et al.*, 1998) that integrates trust from cognition and systems-based sources in addition to strong interpersonal relationships. Hence, its development requires a combination of cognitive, emotive, and communicative factors (Murphy, 2006). Zaheer and Harris (2005) likened the term relational to the reciprocal nature of trust as the inherent time element – through repeated social interactions - could imply preparedness to defer reciprocation of trust to a future exchange. It is thus linked to the demonstration of goodwill - bounded by empathy, dedication and openness (Ireland and Webb, 2007).

3.3 FACTORS THAT INFLUENCE INTER-ORGANISATIONAL TRUST DEVELOPMENT IN CONSTRUCTION

The factors that influence trust development in the construction sector is reviewed primarily from the study by McDermott *et al.* (2004). These are: 1) procurement and institutional framework 2) market Structures 3) creative problem solving 4) relationship uncertainty 5) shared goals and values.

3.3.1 Procurement and Institutional Framework

The behaviour of individuals during projects is influenced by rules of contracting and procurement systems that define actions and expectations over time (McDermott *et al.*, 2004). McDermott *et al.* (2004) further argued that procurement and institutional frameworks that are less fragmented, allow for greater information flows, focus on relationships rather than contractual or financial elements, promote longer-term relationships and reduce the level of uncertainty with respect to final payments would engender higher levels of trust. Eriksson and Laan (2007) also revealed from their survey of 87 Swedish construction clients that procurement procedures that focused on price through output control and authority through process control were detrimental to trust development. They suggested that partnering may be a suitable way to facilitate trust through informal social control. Lau and Rowlinson (2009) found from their investigation of 10 partnering and non-partnering projects using validated trust scales that partnering arrangements yielded more inter-organisational trust than interpersonal trust, the non-partnering projects yielded higher interpersonal trust.

Relational contracts have also been used to foster an institutional environment that promotes trust during construction. In the UK, one of the most widely known and used of such contracts is the NEC suite of contracts. Gerrard (2005) explained that clause 10.1 in the NEC contracts which specifies that parties should “*act as stated in this contract and in a spirit of mutual trust and co-operation*” is a departure from most conditions of contract and law as here, both obligations and attitudes that seek to promote trust are covered. The above arguments thus reveal that institutional mechanisms such as procurement arrangements and contracts can be used to minimize incentives for opportunism, making parties more trustful. These procurement and contractual frameworks therefore contribute to the emergence of system-based trust as discussed in section 3.2.6.2.

3.3.2 Market Structures

McDermott *et al.* (2004) argued that different market structures: labour markets, product markets, materials markets and plant markets present different transactional exchange conditions that translate into different trust environments. They contended that market structures that foster greater collaboration engender trust. However, economic climate influences the leaning towards either collaborative (relational) or transactional (contractual) approaches in different markets. Indeed, evidence of this can be seen from the current recession that has re-introduced a transactional focus across different markets (Khalfan *et al.*, 2007; Manu *et al.*, 2012). An interviewee was quoted in a study by Khalfan *et al.* (2007) as saying:

“I think we are riding on a wave of prosperity at the moment so we can afford the luxury of trust and working together. When it gets down to it if someone [does] a job for £50 and someone else [does it] for £30 the trust will disappear. I think that has happened in the past. At the moment it is reasonable and if you don't get work, no-one will starve”

Smyth (2011) have also argued that austere market conditions create an environment where primary focus is on cost and business survival rather than promotion of collaborative practices. Thus, different market structures and the exchange conditions that they present under different economic climates are external factors that are linked to the extent to which priority is placed on either impersonal (cognition and system-based) or relational-based dimensions of trust during IORs.

3.3.3 Creative Problem Solving

McDermott *et al.* (2004) posited that the demonstration of constructive problem-solving improves trust levels. Wong *et al.* (2000) also found that the achievement of results was a relevant factor that influenced the building and maintenance of trust in project environments. Drawing on a case study of an opera house construction project in Oslo,

Norway, Karlsen *et al.* (2008) found through 11 in-depth interviews that display of reliable behaviour, sincerity, competence, good communication: facilitated by informal relations and conversations, and reaching project milestones were the most interesting and important factors for building trust in project-stakeholder relationships. Laan *et al.* (2011a) also revealed similar findings from their case study of an alliance project that virtuous cycles of trust developed because problems were openly discussed to arrive at innovative solutions. These findings suggest that the demonstration of creative problem-solving abilities during projects is an effective strategy for trust development in the construction sector. This factor is concerned with the trustee's demonstration of high technical competence (trustworthiness), linked more to cognition-based trust as such can be demonstrated independent of any prior relational experience (relational-based trust).

3.3.4 Relationship Uncertainty

The duration and stability of relationships is a key factor that affects trust development (McDermott *et al.*, 2004). Individuals are more likely to trust when they feel that the opposite party is committing to a longer-term collaborative relationship (Wong and Sohal, 2002) and would even pay a premium or settle problems so as to preserve or project relationships into the future. Project participants are more willing to accept vulnerabilities when they perceive the potential to achieve economic value from future relationships. The converse also applies as opportunistic behaviour has been linked to relationship uncertainty (see Sako and Helper, 1998). Yet there remains the challenge of developing conventional long-lasting relationships and trust (relational-based) in the temporary project organisations that are created during projects. Swift and fragile trust (mostly cognition-based) is what usually manifests in such temporary systems (see Meyerson *et al.*, 1996). Relationship uncertainty is thus a factor that limits the emergence of relational-based trust in the construction sector.

3.3.5 Shared Goals and Values

The development of mutually shared goals and values provide basis for trust building in project teams (Arnold *et al.*, 2001). These can be realised through the establishment of strategic management relationships that explicitly demonstrate mutually shared goals and objectives (McDermott *et al.*, 2004). The use of charters and agreements which explicitly prescribe mutually shared goals and values also create a conducive environment for trust development (McDermott *et al.*, 2004). Eriksson and Laan (2007) emphasised profit sharing, accompanied by joint objectives as requirements for trust development in IORs. Laan *et al.* (2011a) revealed from their case study how common interest was achieved through an alliance fund that was created during contract negotiation. This alliance fund was agreed based on the openness of principal and contractor organisations about their risks, design and management budgets. The use of this alliance fund during the project later promoted cooperative relationships that were more conducive to trust as alliance benefits far outweighed opportunities to deviate from agreed upon goals.

Similarly, Kwon and Suh (2004) revealed from their survey of supply chain practitioners that a firm's trust in its supply chain partners is positively associated with both sides' specific asset investments in the relationship. Thus, people freely negotiate and accept compromises in a bid to ensure sustained, healthy and trust-based relationships when there is a feeling that risks and incentives are jointly shared. Such realization of mutually shared goals and values through institutional mechanisms (joint risk and reward sharing, charters and agreements and joint objectives) therefore contribute towards the emergence of system-based trust.

3.4 FUNCTIONAL CONSEQUENCES OF TRUST IN INTER-ORGANISATIONAL RELATIONSHIPS

Though trust does not in itself constitute behaviour, it is acknowledged that psychological expectations that derive from trust and the willingness to accept vulnerabilities influence behaviours that are exhibited during inter-organisational exchanges. According to Zaheer and Harris (2005), inter-organisational trust can result in direct economic outcomes, intermediate relational outcomes and other indirect effects.

3.4.1 Direct Economic Outcomes

Zaghloul and Hartman (2003) established the empirical link between trust and risk perceptions which has consequent effects on contractual provisions in contracts. Findings from 300 respondents in their survey of owners, contractors and consultants in private and public sectors revealed that the level of trust influences formal contractual provisions intended to avert perceived risks (Zaghloul and Hartman, 2003). These contractual provisions further influence every aspect of the project management process such as command structure and authority systems, incentive systems, good communication and team working environment, all of which can reduce transaction costs (Dyer and Chu, 2003; Sako, 2007). The Construction Industry Institute (CII, 1993) also established similar cost-trust relationships where transaction costs are lowered in the presence of trust. Zaghloul and Hartman (2003) further indicated that on the contrary, absence of trust in business relationships raises the need to manage the contracting process using powerful control systems.

Secondly, inter-organisational trust is also said to have positive effects on project management measures such as task performance (Carson *et al.*, 2003) and operational measures such as just-in-time (JIT) delivery, continuous improvements and learning (Sako,

2007). Colquitt *et al.* (2007) found a positive link between trust variables (trustworthiness, trust propensity and trust) and job performance variables such as task performance, citizenship behaviour, counterproductive behaviour and display of affective commitment. Cote and Latham (2006) also revealed that commitment to inter-organisational relationships increases when partners perceive a higher degree of trust.

3.4.2 Intermediate Relational Outcomes

Inter-organisational trust has often been linked to a variety of other outcomes that are not directly economic in nature but nevertheless desirable in any economic relationship (Zaheer and Harris, 2005). Inter-organisational trust positively influences strategic relational flexibility in a supply chain network (Young-Ybarra and Wiersema, 1999; Wathne and Heide, 2004), greater information sharing and knowledge transfer (Butler, 1999; Lee and Whang, 2000; Dyer and Chu, 2003; Szulanski *et al.*, 2004), satisfaction and goal fulfilment (Zaheer *et al.*, 1998; Pinto *et al.*, 2009) and expectations of relationship continuation (Jap and Anderson, 2003). Munns (1995) argued that where there is lack of trust, full and open exchange of information required for success is impeded amongst project teams due to fear of exploitation. McDermott *et al.* (2004) were also of the view that whereas effective management processes and relational procurement systems create opportunities for communication, information flow could still remain unreliable in the absence of trust as project participants are likely to deliberately withhold information and act against the interest of the overall project.

3.4.3 Indirect Effects

There are also other complex relationships between inter-organisational trust and performance such as its interactional and mediation effects (Zaheer and Harris, 2005). Particular among these is how inter-organisational trust affects the influence of social-

control mechanisms on performance. Fryxell *et al.* (2002) revealed that in the presence of trust, social controls positively influence performance and yet have the opposite effect when trust is absent. Recent construction management research findings have similarly echoed the influence of in-formal social control mechanisms on project performance (See Eriksson and Nilsson, 2008; Badenfelt, 2010; Tuuli *et al.*, 2010). Eriksson and Nilsson (2008) advocated for a shift in performance evaluation of projects from traditional reliance on extensive end-inspections of finished work to dependence on contractor's self-regulation with limited random checks. Clearly, inter-organisational trust is required as a mediating parameter, to ensure that any such positive project performance implications of self-regulatory mechanisms are realised.

3.5 TRUST-BASED COLLABORATIVE AGENDA IN CONSTRUCTION INDUSTRY POST LATHAM AND EGAN ERA

Earlier construction industry reports (Latham, 1994; DETR, 1998; Strategic Forum for Construction, 2002) criticised the construction industry's much reliance on competitive tendering and adversarial attitudes. These reports served as catalyst for construction-industry reforms now popularly referred to as the 'Egan agenda' (Smyth, 2010). Other researchers (e.g. Rahman and Kumaraswamy, 2002; Palaneeswaran *et al.*, 2003; Rahman and Kumaraswamy, 2005) have similarly emphasised that achievement of relationally integrated supply chains through relational risk management, relational performance management, relational selection and relational conflict management is necessary for mitigating the numerous problems that exist in the construction industry.

Within the UK construction industry, emphasis has been placed on embedding collaborative practices so as to achieve continuous performance improvements. This era of continuous improvement has been characterised by some shifts from traditional arm's-length

approaches towards relational trust-based approaches, features of which are summarized in Table 3.1. Characteristics of the two approaches as summarized in Table 3.1 are not entirely dichotomous as in practice these can be applied interchangeably. Thus the extent of abstraction in Table 3.1 only provides a broad indication of institutional arrangements that have been employed to promote trust-based collaboration in the construction sector.

Table 3.1: Trust-based versus traditional contractual approaches on projects (Adapted from Eriksson and Laan (2007)).

Project factors	Trust-based approach	Traditional contractual approach
Main contractor and subcontractor selection	Limited bid invitation where soft-parameters are key Best value selection	Competitive bidding with much more focus on price
Delivery modality	Partnering, PFI, BOOT	Design-bid-build, design and build
Contract form	NEC 3 and PPC contracts underpinned by fairness principles	JCT and ICE forms of contract
Supervision/management on site	Self-regulated performance evaluation, collaborative tools and promoting openness e.g. joint administrative system	Exercise of authority through strict enforcement of contract conditions e.g. penalties for non-performance.
Payment mechanisms/arrangements	Target cost plus fee (pain share-gain share arrangements) to serve as an incentive for parties	Lump sum or cost reimbursement following re-measurement of quantities
Dispute resolution	Negotiation and adoption of ADR mechanisms e.g. mediation. Adjudication	Dispute resolution through litigation and arbitration.

Note: PFI – Private finance initiative; BOOT – Build, own, operate and transfer; ADR – Alternate dispute resolution; NEC - New engineering contract; PPC – Project partnering contract.

Smyth (2010) however reiterated that the current economic recession has created an environment where emphasis is placed on price instead of value. This is because short-term efficiency gains have become the dominant priority as opposed to long-term improvements in product and service delivery effectiveness (see Smyth, 2010; Smyth, 2011). Kumaraswamy *et al.* (2010) have also indicated that the current recession re-introduced a cost focus even amongst earlier advocates of industry reforms towards the relational agenda.

Despite the current economic era of austerity, there is however the need to embed collaborative practices as a strategy to leverage long-term value in the supply chain (see Smyth, 2011). The recent UK Government construction strategy 2025 report (BIS, 2013a) for example has outlined visions of increased growth opportunity across the construction supply chain through provision of smart digital designs and low carbon sustainable construction. Proposed measures being taken to ensure that UK construction businesses benefit from such future growth opportunities - which could be missed as a result of integration and collaboration weaknesses - include the following:

- The UK Cabinet Office and Department for Business, Innovation and Skills (BIS) have rolled out a long-term programme to embed building information modelling (BIM) across all centrally procured public construction projects. This is outlined in the UK Government's BIM strategy report (see BIS, 2011) which specifies that all public construction projects irrespective of project size achieve BIM level 2 (Managed 3D environment held in separate discipline 'BIM' tools with attached data, may utilize 4D programme data and 5D cost elements as well as feed operational systems) by 2016 and BIM level 3 (fully open process and data integration enabled by 'web services' compliant with the IFC/IFD standards, managed by a collaborative model server) between 2016 and 2025.
- To adopt a strategic approach to procurement that embraces whole life value and early engagement of the supply chain in design development. Currently, three new construction procurement models: two stage open book, cost-led procurement and integrated project finance; are being piloted by the UK Government, all of which embrace the principles of early contractor involvement, collaboration and transparency (see BIS, 2013a pp. 53).

Early supply chain involvement, collaboration and transparency are all principles that can only be achieved in a trust-based atmosphere. There is therefore the need to continuously explore strategies for inter-organisational trust development in construction, not least amongst MC organisations who some researchers (see Karim *et al.*, 2006; Mason, 2008; Smyth, 2010) have claimed to have the added responsibility of managing greater number of construction stakeholders. Such efforts could contribute to theory building and development of practically relevant management knowledge for improving inter-organisational trust in the construction sector, consequently creating an enabling environment for long-term construction industry visions to be fully realised.

3.6 TRUST RELATED PROBLEMS IN MC-SC RELATIONSHIPS

Greenwood (2001) argued that relationships between MCs and SCs remain traditional, cost driven and potentially adversarial. Greenwood *et al.* (2005) further revealed that SCs are sometimes charged liquidated damages that far exceed the value of their subcontract package as there is often no pre-ascertained liquidated damage proportionate to the level of risk they pose. Such unlimited liabilities for delay damages are often a source of discontent amongst SCs.

A recent survey of UK SCs revealed other trust inhibiting MCs practices such as late payments, charging fees to tender for work, award of contracts based on cheapest price rather than best value, demand of retrospective discounts and cash rebates from suppliers (see Hurley, 2012). According to Hurley (2012), 97% of the 250 SCs surveyed in the UK felt they were unfairly treated by MCs but chose not to report such unfair practices due to the fear of losing future work. Knutt (2012) also reported that tier one contractors have sometimes improved their margins by squeezing the supply chain through prolonged

payments. The power imbalance in MC-SC relationships can thus result in unfair treatments (Yik *et al.*, 2006), that ultimately translate into a culture of distrust.

SCs also present their own trust-related problems to MCs. Low profit margins and difficulties in accessing credit from financial institutions (Paunov, 2011) have contributed to cash flow difficulties which tend to intensify further down the supply chain; with one in ten large construction firms known to be reliant on financially high risk suppliers (CIOB, 2012). SC practices such as sub-economic or negative pricing (Hinze and Tracey, 1994) also remain problematic issues. The onus is thus on MCs to carefully assess financial risk of SCs and mitigate any possibility of bankruptcy during projects. Secondly, SCs sometimes lack the capacity to adopt modern quality management practices, embrace technological advancements or invest in human resource development (Hsieh, 1998; Lin and Gibson, 2011), all of which can affect sustained improvements in quality performance during projects. Love and Li (2000) for instance found that poor workmanship by SCs were a primary cause of defects.

Subcontracting has also been linked to adverse H&S consequences (see Arditi and Chotibhongs, 2005; Ankrah, 2007; Manu *et al.*, 2010b; Manu *et al.*, 2013b). Specifically, Ankrah (2007) argued that SCs' disregard for site rules and poor housekeeping can increase opportunities for accidents. Ankrah (2007) further suggested that such negative consequences of subcontracting could however be overcome through measures such as induction, training and partnering (building long-term relationship). It was thus recommended that MCs promote stability by retaining a competent but limited pool of SCs so as to help align SC goals to that of their projects. Given that some UK MCs have implemented SCM practices a strategy to manage SCs (see King and Pitt, 2009), and have continued to embed such collaborative practices throughout recent austerity periods (Smyth,

2011), there is the opportunity to interrogate the implications of such practices for inter-organisational trust development amongst their supply chain.

3.7 EMPIRICAL PHASE OF THE RESEARCH

The literature review in chapter two has emphasised that whilst much empirical research has considered inter-organisational trust as an antecedent of successful SCM implementation, similar empirical considerations have not been given to how adoption of SCM principles can yield inter-organisational trust, although this position is occasionally implied in conceptual discussions. The literature reviews in chapters two and three have therefore raised probing questions about strategic SCM implementation in MC organisations and its consequent influence on inter-organisational trust development, which can only be answered through empirical enquiry. This study thus seeks to answer the following research questions:

1. What constitutes the SCM practices adopted by UK MCs to manage SCs during projects?
2. How does inter-organisational trust develop between MCs and SCs within the context of such SCM practices?
3. What are the functional consequences of inter-organisational trust within the context of the MCs supply chain during projects?
4. How can inter-organisational trust in the MC's supply chain be managed using SCM as a strategy?

In addition to raising the above questions, the literature reviews (Chapters Two and Three) would further inform research design and methodological choices for the empirical phase of this research. These are discussed in the next chapter (Chapter Four).

3.8 SUMMARY

This chapter has sought to conceptualise inter-organisational trust by providing a holistic definition of the concept from different academic and theoretical perspectives. Furthermore, the different concepts required to understand the multi-faceted and sometimes elusive nature of trust have been discussed i.e. attributes of trust, subjects and objects of trust, trust and trustworthiness, interpersonal and inter-organisational trust, and dimensions of trust based on production modes – cognition, system and relational-based. The factors that influence inter-organisational trust development in construction have also been argued to encompass procurement and institutional framework, market structures, creative problem solving, relationship uncertainty and shared goals and values. Inter-organisational trust was further discussed as having direct economic outcomes, intermediate relational outcomes and indirect effects in inter-organisational exchanges.

The trust-based collaborative agenda in the construction industry post Latham and Egan era has also been placed in perspective. It was argued that despite setbacks to continuous improvement efforts due to the current austerity era, sustained efforts (especially by MCs) were required to embed trust-based collaborative practices so as to achieve long-term construction industry visions across the supply chain. Trust related problems in MC-SC relationships have been reviewed, before highlighting research questions that have been formulated from the literature reviews (Chapters Two and Three) and the need to investigate these through empirical inquiry. The next chapter (Chapter Four) discusses the research design and methodology adopted for the empirical phase of the study .

CHAPTER FOUR: RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

This chapter presents the research design and methodology adopted for the study. The chapter begins with discussions of different philosophical and methodological positions in research before arguing the philosophical stance and methodological approaches adopted for this study. The research process, which comprises the research design, data collection, data analysis and framework development and evaluation phases are also discussed. Finally, the chapter highlights ethical considerations that were upheld throughout the study. The purpose of this chapter is thus to achieve objective three of the research: empirically investigate strategic supply chain management (SCM) practices of MCs and its influence on inter-organisational trust development.

4.2 RESEARCH PHILOSOPHY

The research design process always begins with philosophical assumptions that have practical implications for designing and conducting research (Saunders *et al.*, 2011). Despite these research philosophies being latent (Creswell, 2012), they still have to be identified and discussed as they set the context for the investigator's study (Ponterotto, 2005). The three philosophical issues that are considered in this study are the researcher's stance towards the nature and existence of reality (ontology), how the researcher knows what is known (epistemology) and the role of the researcher's values in designing and conducting the research (axiology).

4.2.1 Ontological Position

The issue of research ontology relates to the nature and existence of reality. The two divergent perspectives on the nature of reality are objectivism and subjectivism (Bryman, 2012). The objectivism or realist position views the existence of reality as external and

independent to the perceptions of social entities. The subjectivism or relativist position on the contrary views reality as a subjective experience whereby multiple realities can exist depending on the relative perceptions of individuals (Ponterotto, 2005). This relativist position therefore stipulates the absence of an absolute reality.

4.2.2 Epistemological Position

Epistemological assumptions in research relate to the questions of ‘what constitutes acceptable knowledge’ and ‘how we know what we know’ (Knight and Turnbull, 2008) especially in terms of the relationship between the researcher and the researched. Smyth and Morris (2007) argued that blurring out epistemological issues in research can potentially weaken the knowledge base for research and practice. The two dominant and divergent epistemological positions in research are positivism and interpretivism (Ponterotto, 2005). Positivism is founded on the belief that the world conforms to fixed laws of causes and effects and therefore emphasises objectivity, measurement and repeatability in the study of social or natural phenomena (Ponterotto, 2005). The researcher can therefore be objective from a detached position of the research situation given the existence of a universal truth that exists independent of the distance between the researcher and that being researched. The researcher in such instances is considered an ‘outsider’ (Creswell, 2012).

In contrast, interpretivism is founded on the belief that reality is subjectively constructed, for which the researcher has to constantly interact with the object of investigation as an ‘insider’ (Creswell, 2012) to uncover deeper meanings through interactive dialogue and interpretation (Ponterotto, 2005). Thus, the more the researcher engages with research participants in their natural settings, the more they (the researcher) get to ‘know what they know’ about what is being researched.

4.2.3 Axiological Position

The axiological position is concerned with the role of the researcher's values, intuitions and biases in the research process (Ponterotto, 2005). When the researcher takes an objective position, the research process is arguably less value laden as the researcher's values become less important. If a subjective position is taken, such values and lived experiences cannot be divorced from the research process. It is therefore important for the researcher to duly acknowledge biases that are introduced through their personal values, beliefs and prior knowledge in interpretivist research (Malterud, 2001; Ponterotto, 2005; Creswell, 2012). Although there is no agreement on the importance of formally acknowledging the extent to which the researcher's own values influences the research process – reflexivity – it still remains a necessary process in qualitative research (Strauss and Corbin, 2007).

4.3 RESEARCH METHODOLOGIES AND METHODS

Methodology refers to the process and procedures of the research and naturally flows from the researcher's position on ontology, epistemology and axiology (Ponterotto, 2005). The two dominant categorizations of research methodologies that derive from the philosophical positions discussed above are quantitative and qualitative research (Ponterotto, 2005) although mixed-method strategies also exist (Creswell, 2009). These two broad strategies of inquiry are rooted in the objective and subjective ontologies as well as in positivist and interpretivist epistemologies. Quantitative research strategies refer to research designs that employ numerical and objective measurements in addressing research questions. This therefore aligns with deductive reasoning (Creswell, 2009) where there is *a priori* formulation of theories or hypotheses that are operationalized and subjected to rigorous empirical testing.

Qualitative strategies however, refer to research designs that explore meanings and causal interactions through the use of textual rather than numeric data. Qualitative strategies align with inductive reasoning where there is no *a priori* hypotheses to be tested empirically as is done in deductive research (Creswell, 2009).

4.3.1 Quantitative Research Approach and Methods

Quantitative research approaches focus on testing theories by examining the relationship between variables. There are two main quantitative research approaches; experiments and surveys although according to Creswell (2009), there are also less vigorous experiments referred to as quasi-experiments can also be undertaken. These methods of research involve numbers and classes that are analysed using statistics (Runeson and Höst, 2009).

4.3.1.1 Experiments

Experiments are investigations that seek to measure the effect of manipulating one variable against another variable in a controlled environment. To test causal relationships between variables, all experiments involve at least a treatment, an outcome measure, units of assignment and a form of comparison based on which change could potentially be attributed to the treatment (Cook *et al.*, 1979). Pure experiments are characterised by the random assignment of treatment which is easier to achieve with objects in a laboratory than with humans in the field (Cook *et al.*, 1979). Quasi-experiments are experiments that retain similar properties as true or pure experiments but where treatment for comparison is not randomly assigned (Cook *et al.*, 1979). The use of experiments in behavioural sciences are however limited because of the difficulty to manipulate conditions of interest when studying the most important social questions (Stangor, 2010).

4.3.1.2 Surveys

Surveys involve the assessment of thoughts, feelings and opinions through the administration of questionnaire instruments. Questionnaires are usually administered to a representative sample selected from a wider population although census surveys can also be undertaken to collect information from everyone (Gomm, 2004). The issue of statistical representativeness is a very important consideration in survey research (Gomm, 2004). The advantages of surveys are that they are relatively in-expensive in reaching a large number of respondents in different geographical areas, are more likely to produce honest responses due to anonymity of respondents and are less likely to be influenced by the characteristics of the researcher (Stangor, 2010). The downside however remains that surveys are often structured, cross-sectional and shallow in nature and therefore only suited for producing a 'snapshot' of opinions, attitudes or behaviours of a group of people at a specific time (Stangor, 2010).

4.3.2 Qualitative Research Approach and Methods

Qualitative research approaches are aimed at exploring the meanings that individuals attach to human or social problems. Qualitative research involves data in the form of words, descriptions, pictures and diagrams, and data is primarily analysed through categorization and sorting (Runeson and Höst, 2009). Although different qualitative research strategies exist, the five main qualitative research traditions as classified by Creswell (2012) are considered in this study. These are summarized in Table 4.1 as narrative research, phenomenology, grounded theory research, ethnographic research and case study research.

Table 4.1: Qualitative research designs (Creswell, 2012)

Dimension	Narrative research	Phenomenology	Grounded Theory	Ethnography	Case Study
Focus	Explore life of individual	Understanding essence of experiences about a phenomenon	Develop theory grounded in data from the field	Describe and interpret a cultural or social group	In-depth analysis of a single or multiple cases
Disciplinary origin	Anthropology	Psychology	Sociology	Cultural anthropology	Political science
Data collection	Interviews and documents	Statements, meanings, themes, general descriptions	Interviews with 20-30 individuals to saturate categories and detail a theory	Observations and interviews during extended fieldwork (e.g. 6m-1yr)	Multiple sources including documents, interviews, artefacts
Data analysis	Stories, epiphanies, historical context	Statements, meanings, themes, general descriptions	Open, axial, selective coding, conditional matrix	Description, analysis, interpretation	Description, themes, assertions
Narrative form	Detailed picture of individual's life	Description of essence of experience	Theory or model	Description of cultural behaviour of group or individual	In-depth study of case or cases

4.3.2.1 Narrative Research

Narrative research focuses on capturing the lived experiences of an individual such as in the case of biographical or autobiographical studies of individuals (Creswell, 2012). Andrews *et al.* (2008) described two main forms of narratives: event-centred and experience-centred narratives. The researcher begins by identifying and selecting an individual who has a story or life experience that aligns with the question being explored. The researcher also collects information relating to the historical context of narrative stories such as culture, time and place of events. Finally, stories are retold by the researcher in a narrative chronology using an appropriate framework.

4.3.2.2 Phenomenological Research

Phenomenological research focuses on capturing the lived experiences of different individuals to identify what they share in common about a phenomenon (Creswell, 2012).

The aim is to gain deep information and perceptions of phenomena (Lester, 1999) whilst refraining from any pre-given framework (Groenewald, 2004). Thus data has to be collected from participants who have lived experiences of the phenomena being studied. Hycner (1999) claimed that in phenomenological research, the phenomenon dictates the method e.g. sampling strategy and not vice versa as that would otherwise constitute injustice to the integrity of the phenomenon.

4.3.3.3 Grounded Theory Research

Grounded theory emerged as an alternative approach to deductive forms of theorizing where theories initially derived from the researcher's imagination before being subjected to any empirical research testing (Dey, 1999). Rather than have such *a priori* theoretical orientation that stems from imagination, grounded theory researchers believe that theories should be 'grounded' in data from research participants. Glaser and Strauss (1967) therefore proposed grounded theory as a flexible process that allows for theory generation through constant interplay of data collection and analysis to ensure that theory is closely related to evidence before further research testing.

Grounded theory is thus described as a methodology developed mainly for the purpose of building theory from data (Strauss and Corbin, 2007). Rather than just building descriptions from research participants as in the case of narrative and phenomenological research, the researcher goes beyond descriptions to generate or discover a theory (Denzin and Lincoln, 2003). Research participants are thus theoretically sampled to ensure that a theory can be established based on the actions, interactions or processes that individuals engage in (Martin and Turner, 1986; Denzin and Lincoln, 2003). The data analysis process termed constant comparative analysis (see Glaser and Strauss, 1967) often begins with open coding of major categories with concurrent (zigzag) movements between field and office to ensure that

information on the various categories become saturated and the emerging theory is sufficiently elaborate in all its complexity (Hunter and Kelly, 2008; Creswell, 2012).

4.3.3.4 Ethnographic Research

Ethnographic research focuses on establishing shared patterns of values, behaviour or beliefs amongst a cultural group (Creswell, 2012). It therefore involves extended observation of the group – through participant observation – in their natural settings so as to ensure that the researcher is immersed in the day-to-day lives of participants. Ethnography is very useful in circumstances where little is known about the beliefs, values or behaviours of a particular group though a discernible pattern can be established. Ethnographic research is therefore longitudinal in nature and could span years although contemporary ethnographers tend to work for shorter periods to uncover particular aspects of a culture group (LeCompte and Schensul, 2010).

4.3.3.5 Case study Research

Case study research is described as a strategy for empirically investigating a contemporary phenomenon within its real life context using multiple sources of evidence (Runeson and Höst, 2009; Yin, 2013). Case study research has a peculiar advantage for instances where the boundaries between the concept being studied and the context are not clearly evident and where questions of ‘how’ and ‘why’ are being asked about contemporary sets of events that the researcher has little or no control over (Yin, 2013). The opportunity to incorporate different sources of evidence – triangulation - (Proverbs and Gameson, 2008; Yin, 2013) is also a distinct advantage of case study research. The different sources of evidence: interviews, document analysis and observations, must be interwoven to arrive at a coherent narrative (Proverbs and Gameson, 2008).

Yin (2013) outlined four types of case study designs based on the number of cases and the number of units of analysis in each case. Case study research can be a single case with a single unit of analysis, a single case with multiple embedded units of analysis, multiple-case studies with a single unit of analysis or multiple case studies with multiple embedded units of analysis as shown in Figure 4.1. Single cases focus on in-depth investigation with the objective of providing a rich description of the concept under study whereas multiple cases align with the principle of theoretical replication and cross-case comparison (Darke *et al.*, 1998).

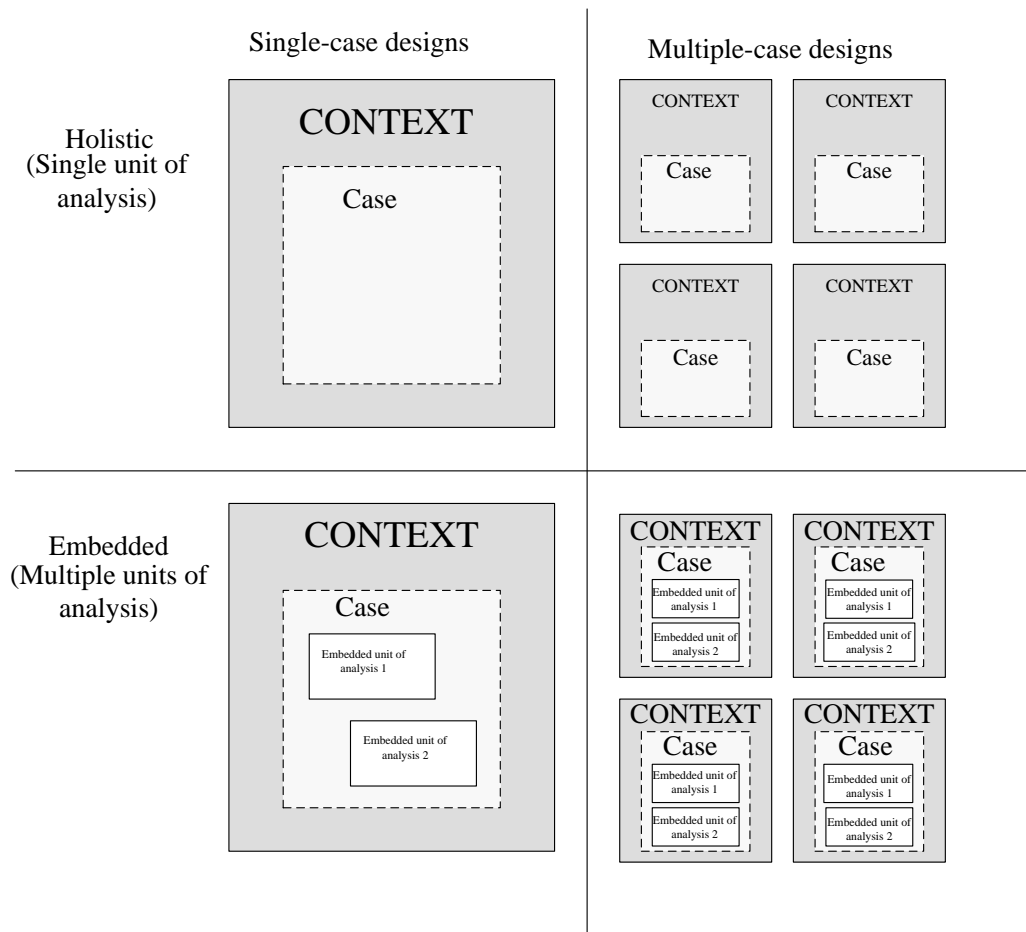


Figure 4.1: Types of case study design (Yin, 2013)

The issue of validity in case study research is also very important in judging the quality of logical sets of statements which emerge from the research with Yin (2013) suggesting four different validity tests that can be applied in case study research (see section 4.4.1.2.4).

From the above discussions, it can be seen that different methodological choices are indeed influenced by underlying philosophical considerations that set the research context. A summary of the different philosophical and methodological issues associated with the two broad research orientations: positivist and interpretivist research are summarised in Table 4.2.

Table 4.2: Philosophical and methodological issues in research

Research Orientations	Ontology (nature of reality)	Epistemology (knowledge)	Axiological (role of values)	Methodological (research strategies)
Positivist Research	Fixed, stable, observable and measurable	Gained through scientific and experimental research. Knowledge is objective and quantifiable	Emphasis is on the objective researcher, value free	Quantitative via experiments, quasi-experiments or survey research
Interpretive Research	Multiple realities that are socially constructed by individuals	Gained through understanding the meaning of the process/experience	Researcher's subjective values, intuition and biases are important and researcher needs to acknowledge their values and biases	Qualitative via narrative, phenomenology, ethnography, grounded theory, case study research

4.4 PHILOSOPHICAL AND METHODOLOGICAL POSITIONS OF THIS RESEARCH

According to Creswell (2009), the research design process involves inter-connections between philosophical assumptions, strategies of inquiry and research methods adopted in a study. Firstly, this present study is situated in the subjective ontological position discussed in section 4.2.1 because the concept of trust in itself is a psychological phenomenon that is subjectively rooted in the minds of the individuals being studied. Secondly, the study focuses on unravelling deeper meanings from such subjective perspectives regarding main contractors' (MCs') supply chain management (SCM) practices and how these influence inter-organisational trust dynamics during projects. The study is therefore grounded in the

interpretivist epistemological position where the researcher has to be close to the researched so as to explore complex subtleties on trust manifestation in the natural supply chain setting (during projects). This interpretivist epistemological position aligns with the adopted subjective ontology of multiple realities.

The interpretivist epistemology also suggests that interpretations of such multiple realities would be influenced by the researcher's values and beliefs. However, steps (detailed in section 4.4.1.2.4) were taken throughout to minimize any such bias during the study. Additionally, whilst there is no agreement on the importance of formally acknowledging the extent to which the researcher's own values influences the research process - reflexivity – (Strauss and Corbin, 2007), the researcher in section 11.8 has reflected upon his role as the investigator, personal background, pre-study beliefs, and motivations for the study and how these impacted on the research process. The philosophical positions outlined above dictated the adoption of a qualitative research strategy.

4.4.1 Evaluation and Choice of Research Method for this Study

To further justify the choice of a qualitative research strategy, different qualitative and quantitative research methods were evaluated to determine the most appropriate for addressing the research questions posed in this study.

Different versions of trust game experiments have been applied to the study of trust. Such trust games are designed based on game-theoretic rationality to investigate the influence of trust on decision making (see for example Fetchenhauer and Dunning, 2009; Evans and Krueger, 2010). In the study by Evans and Krueger (2010) for instance, a trust game experiment was designed to test the extent to which trust decisions depended on potential risks (assessed through egocentric costs and benefits) and probability of reciprocity

(derived from a party's temptation to defect). Risk and temptation were orthogonally manipulated with two levels of risk as a single index (cost/benefit): low risk (cost 5/benefit 15) and high risk (cost 15/benefit 5) alongside temptation levels that give different payoffs. Online participants were recruited to complete 10 rounds of the game against simulated partners, which revealed that trust was significantly influenced by risk and reciprocity.

Hartmann and Caerteling (2010) also used a choice-based conjoint experiment to evaluate the relative importance of price and trust in subcontractor procurement in construction. Main contractors were made to choose between four SCs - three known and one unknown - against two varying levels of different criteria: price, technical know-how, quality and cooperation. It was revealed that price was by far the main criterion for MCs' preference followed by quality and cooperation with technical know-how being of least importance.

This application of trust-based experiments to trust research have not been devoid of any shortcomings. Hartmann and Caerteling (2010) acknowledged that the limited number of attributes and the assumption that choice decisions of participants are based on the same set of attributes remains a major shortcoming. Since the interest of this research was to explore within context, the richness and depth of the relationship between MCs' SCM practices and trust dynamics rather than causal relationships between these two variables, it became clear that an experimental research design could not be adopted. Moreover, it would have been difficult under experimental conditions to explore such trust dynamics from both MC and SC perspectives within the context of an actual construction project.

Surveys were also given consideration as these have been used extensively in trust research. Trust measurement scales have been used to measure different levels of trust amongst construction practitioners (see Shek-Pui Wong and Cheung, 2004). Arriving at a single

measure that is capable of capturing the complex and multi-dimensional nature of inter-organisational trust is however difficult to achieve and these survey-type studies have often revealed that other contextual factors are likely to account significantly for variances in interrelationships between trust and other related variables (Laan, 2009). The rigid nature of such survey instruments also address trust as static rather than a dynamic concept; limiting a rich exploration of inter-organisational trust within context.

Given that the focus of this study was to undertake an in-depth exploration of the trust development process in relation to MCs' SCM practices rather than an industry-wide measurement of trust levels, survey research was discounted as a suitable approach for the study. Additionally, it would have been practically and logistically difficult to obtain representative samples of both MC and SC personnel that constitute the organisational supply chain (MC's supply chain) to complete the survey.

Narrative and phenomenological research were also discounted because these are more suitable for capturing the lived experiences of individuals and groups respectively. Due to the study's focus on SCM practices and inter-organisational trust dynamics, the appropriate research design did not have to be centred only on the individuals but also other situational issues that could influence trust expectations. Narrative research was thus inappropriate because the objectives of this study did not aim to assemble a composite summary of inter-organisational trust but to understand how it develops within the context of different strategic SCM practices implemented by MCs. Since phenomenology does not permit considerations outside personal consciousness (Groenewald, 2004), it was not also considered appropriate for this study.

Grounded theory research was also given consideration due to its use of observations and interviews for inductive theory generation. However, since the study did not aim to generate a theory on SCM or inter-organisational trust (IOT) *per se*, but to provide a rich and in-depth account of how SCM strategies are implemented in practice by MCs and how this in turn influences inter-organisational trust development in their supply chain, it had to be discounted as the most favourable strategy.

Ethnographic research could also have been a potential strategy for exploring the SCM process during projects and how this influenced inter-organisational trust development. Yet, the dominant use of participant observation and the time-dependent nature of ethnographic studies made this option less feasible. The confidential nature of negotiations that ensues between MCs and their supply chain was also likely to present access difficulties as an active participant during any such meetings. Moreover, the study's focus on gaining a better understanding of how different SCM strategies influence inter-organisational trust development would have demanded more than one ethnographic study. This would have been practically difficult to achieve within the limited timeframe allocated for the study. A case study approach was left as the most feasible option for undertaking the study.

4.4.1.1 Justification of Case study Research Strategy

Case study research is suitable when researchers intend to undertake in-depth exploration to uncover deeper meanings of a complex concept, such as in this case inter-organisational trust development in the MC's supply chain. Scholars have advocated for the use of longitudinal-type studies to gain a better understanding of the inter-organisational trust development process (see for e.g. Laan, 2009). The relevance of context in the development of inter-organisational trust has often been suggested from quantitative studies (see for e.g. Laan, 2009). Bijlsma-Frankema and Costa (2005) have thus argued that the context within

which inter-organisational relationships are embedded should explicitly be taken into account when studying inter-organisational trust development. Case study research therefore provides that avenue to study the inter-organisational trust development process in the supply chain over a period of time, within the context of the MC's supply chain during projects. It is also the most suitable given that boundaries between inter-organisational trust development and the context within which supply chain relationships are constituted can be blurred and intertwined.

Secondly, the opportunity to triangulate multiple sources of evidence using case study research (Proverbs and Gameson, 2008) was considered a distinct advantage. Methodological triangulation (different data collection methods) and data source triangulation (different sources of evidence) (see Yin, 2013) become possible through this approach. Methodological triangulation was achieved through the use of interviews, passive observations and document analysis. Data source triangulation was achieved through interviews with multiple personnel within the same category of relevant informants (i.e. MC and SC personnel) to assemble different perspectives on the same issues.

Furthermore, case study design is considered the most suitable for answering the predominantly 'how' research questions posed in this study. The main research questions on 'how' MCs manage their supply chains and 'how' inter-organisational trust develops in the MC's supply chain are ideal questions for case study research. The research question on 'what' the functional consequences of trust are in the MC's supply chain is also of a 'how' nature as it is concerned with 'how' trust perceptions in the supply chain influence behaviour and consequently any project performance outcomes.

4.5 RESEARCH PROCESS

The research process involved four different phases as shown in Figure 4.2 which are: 1) research design phase; 2) data collection phase; 3) data analysis phase 4) framework development and evaluation phase.

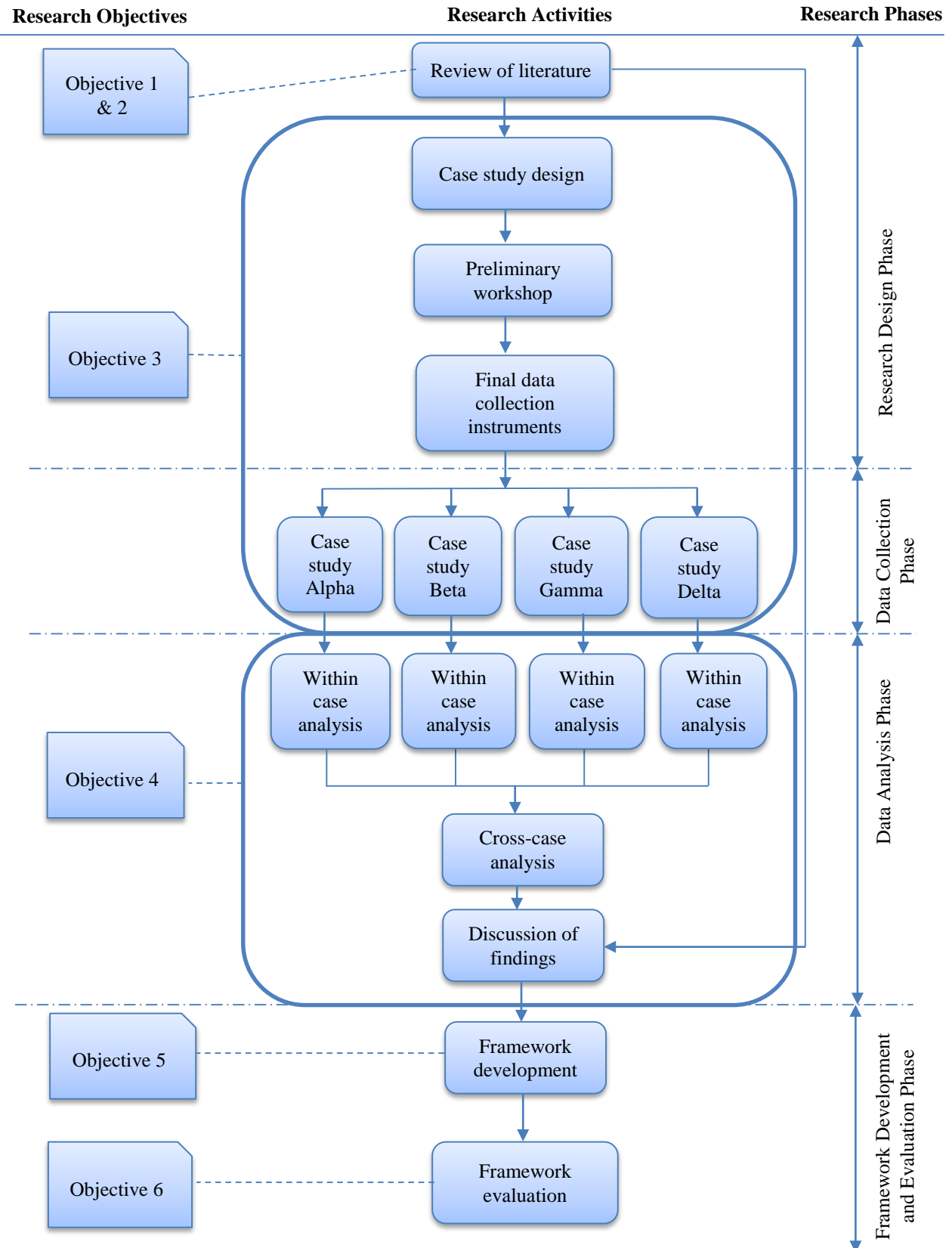


Figure 4.2: The overall research process

4.4.1 Research Design Phase

The research design phase involved three main activities: 1) review of literature; 2) case study design; 3) preliminary workshop.

4.4.1.1 Review of Literature

Literature review on strategic supply chain management was undertaken in chapter two. A definition of SCM as well as its historical evolution in the manufacturing sector were presented before distinguishing between the operational and strategic SCM perspectives. The emergence of strategic SCM in the construction sector was further discussed. It was revealed that project-based SCM - which is client-led - has received greater research attention than organisational-based SCM which is contractor-led. Empirical research work on contractor-driven SCM was thus still lacking despite integration challenges that exist in the MC and SC interface of the construction supply chain. Though lacking empirical support, contractor-driven SCM implementation was argued to have potential implications for inter-organisational trust development between MCs and SCs.

The concept of inter-organisational trust was then reviewed in chapter three, with interrogation of literature from different theoretical and academic perspectives so as to reveal its multi-faceted nature. It was argued that the complex and multi-dimensional nature of trust made its development at the inter-organisational level less understood. The need for sustained efforts to promote inter-organisational trust across the construction supply chain was also highlighted as being fundamental to the realisation of long-term construction industry visions in the UK. Given the dearth of research on inter-organisational trust development at the MC and SC interface of the construction supply chain, research questions were formulated to explore knowledge gaps on strategic SCM practices employed by MCs and their implications for inter-organisational trust development during projects.

4.4.1.2 Case Study Design

A multiple case study design (Yin, 2013) was adopted for this research as it provided the opportunity to explore inter-organisational trust dynamics in the supply chain of different UK MCs. The differences in operating context of construction organisations such as culture and structure (Ankrah and Langford, 2005) are likely to translate into differences in SCM practices, which could have different implications for inter-organisational trust development. Thus, a multiple case study approach was considered to provide the best opportunity to explore how any such differences influenced inter-organisational trust dynamics. These multiple case studies also comprised multiple embedded units of analysis as discussed in the next section.

Yin (2013) suggested that case study research can embrace both realist and relativist or interpretivist epistemological orientations. The vision with the realist stance is to achieve theoretical or analytical generalization through replication – explanatory focus. An interpretative-type case study design which has an exploratory focus was however adopted as the most suitable for answering the research questions posed in this study. Having taken this position that research participants would reflect multiple realities and meanings about the MC's SCM strategy and its consequent influence on inter-organisational trust dynamics, the aim was to thoroughly understand such multiple realities and maximize what could be learnt from the selected cases as suggested by Stake (1995).

4.4.1.2.1 Units of Analysis

The unit of analysis in case study research is what constitutes a 'case' and this can be an individual, a group, an organisation, a phenomena or an event (Darke *et al.*, 1998; Yin, 2013). Yin (2013) claimed that the inability to define what constitutes a 'case' at the very onset of case studies is a predominant problem whereas Fellows and Liu (2009) advised that

the unit of analysis be made explicit when undertaking case study research. The unit of analysis in this research was the construction project as this is the environment where MC personnel deploy their SCM strategy during engagements with the supply chain. It is also during the construction project that MC personnel and their supply chain would reflect constantly changing psychological expectations about each other as well as display any behaviours that derive from such psychological expectations. Thus the construction project was used as a 'microscope' to investigate supply chain interactions between the MC's personnel and their SCs *vis-à-vis* the strategic SCM practices that were deployed in accordance with their organisational policy.

4.4.1.2.2 Case Study Selection

Creswell (2012) suggested that in case study research, cases should be carefully and purposefully selected to reflect different perspectives on the problem or process under study. Thus, the sampling strategy that was used to select cases for this research was the 'maximum variation sampling' which according to Miles and Huberman (1994), involves the selection of diverse cases so as to identify common themes. Given the strategic SCM focus of the study, only large UK construction firms that subcontracted work and were known to have implemented strategic SCM practices for managing their subcontractors were approached for participation. To achieve this, a list of 50 UK construction firms by annual turnover was compiled using the construction index¹ league table as at November 2011. Further checks were undertaken on the websites of these 50 organisations to ensure that they had in place a supply chain policy for managing their subcontractors before case study engagement materials - which comprised a solicitation letter and brief research proposal (see samples in Appendix B) - were developed and sent out to these shortlisted construction organisations

¹ <http://www.theconstructionindex.co.uk>

to solicit their participation. Seven (7) of the firms responded by providing contact details of a 'gatekeeper' with whom further access negotiations could be undertaken.

Although no fixed number of cases are known to be adequate for qualitative research, Creswell (2012) recommended that researchers choose no more than four to five cases as more cases could weaken the level of depth achieved in any single case. The choice of many cases would only be preferable if the aim is to test a theory. This not being the case, four cases were targeted for this research. To achieve this, four (4) of the seven (7) organisations were selected for the research after negotiations with 'gatekeepers'. These were the four organisations that provided the most access to their projects as well as cases that reflected different project circumstances (see next section for further details).

4.4.1.2.3 Negotiating Access

Meetings were arranged with 'gatekeepers' to discuss the level of access and nature of data required for the research. These were detailed in a data collection plan (see Appendix B) that was provided to 'gatekeepers' during the negotiation meetings. The 'gatekeepers' agreed to grant most of the required access except for the request to review bid reports for selected subcontract packages as they claimed that this contained commercially sensitive information. Four (4) of the firms were carefully selected after negotiation meetings as these provided the most adequate access, and had live projects that were likely to present different contextual environments for examining the SCM implementation process. Projects with different profiles i.e. nature of the works, type of client, type of project, proposed duration, stage of progress, procurement arrangement, contract form and contract sum were selected to reflect the adopted maximum variation sampling strategy.

For example, project Delta was an infrastructure project (waste transfer station), project Alpha was an office construction and projects Beta and Gamma were school projects. The forms of contracts and procurement methods that were used also varied across the four projects so as to explore any influence of these contextual factors on the inter-organisational trust development process in the supply chain. Each project was also at a different stage of progress so as to provide a holistic view of how inter-organisational trust dynamics was influenced by the project lifecycle.

4.4.1.2.4 Quality of Research Design

Yin (2013) described the four tests that are relevant for establishing the quality of case study research. These are: 1) construct validity; 2) internal validity; 3) external validity and 4) reliability. These four tests were used to ensure the quality of this research.

4.4.1.2.3.1 Construct validity

Yin (2013) construct validity as the process of establishing correct operational measures for the concepts being studied. Yin (2013) continued to suggest that construct validity can be achieved through the use of multiple sources of evidence (triangulation), establishing a chain of evidence and having key informants review draft case study reports. These three strategies were employed to ensure construct validity. Methodological triangulation was achieved by acquiring data through different methods: interviews, documentary analysis and passive observations although the level of access gained varied across the four case study projects. Data source triangulation was further achieved by interviewing different personnel from the MC's project team and different SCs on the project on similar issues so as to avoid an individually biased perspective. A chain of evidence was also maintained through a case study database that was created using qualitative data analysis software NVivo version 9. This case study database contained all the interview transcripts, field

notes, company and project profiles and relevant documentation obtained from each case. A brief case study report and PowerPoint presentation were also used to gain feedback from selected participants on the research findings (see section 4.4.4).

4.4.1.2.3.2 Internal validity

Internal validity has broadly been described by Yin (2013) as the problem of ensuring that the right inferences are made from interviews and documentary evidence when an event has not been observed directly by the researcher. Firstly, a preliminary workshop and subsequent informal discussions were undertaken to ensure that data collection instruments were unambiguous as detailed in section 4.4.1.3. During the data collection and analysis period, telephone calls were also made to some interviewed participants to seek further clarification. In one instance, a second interview had to be scheduled with the same participant to clarify some issues that had emerged from the first interview.

Internal validity was also achieved by presenting research findings to selected participants so as to obtain their feedback through an evaluation interview. The presentation comprised the management framework (see chapter nine) that consolidated the research findings and an appendix section that showed how SCM practices differed across the four organisations (same as Table 1 of Appendix C3). Participants affirmed the findings with further examples during these evaluation interviews. These strategies helped to ensure that accurate interpretations had been made during the data analysis process.

4.4.1.2.3.3 External validity

External validity has been described by Yin (2013) as defining the limits to which a study's findings can be generalised. To achieve external validity, Yin (2013) suggested the use of theory in the case of a single-case study and replication logic for multiple case-study

designs. Though this study did not aim for generalization of findings, some degree of external validity was achieved by following the logic of replication through the multiple case study design suggested by Yin (2013). The study was replicated across four (4) cases and findings from each case were compared through a cross-case analysis (see chapter nine). Again, one (1) of the participants in the evaluation process was from another MC that was not part of the four (4) case study organisations used in the main study. This was to get an external view on the findings from another UK MC that had also implemented strategic SCM principles. Furthermore, publications were developed during the research (see Appendix A) so as to subject arguments that emerged from the literature to peer review.

4.4.1.2.3.4 Reliability

Reliability is described as the degree to which the same findings can be obtained if the same research is repeated (Silverman, 2011; Yin, 2013). Yin (2013) suggested that reliability can be achieved by using a case study protocol as well as developing a case study database. Reliability in qualitative research can also be achieved when the research process is transparent and enough detail of the research strategy and data analysis methods are provided (Silverman, 2011). These three strategies were adopted in this study to ensure reliability. A case study protocol (see Appendix B) was developed for the study which comprised a data collection plan and interview guides.

The data collection plan contained a detailed breakdown of information source (i.e. interviews, project data sheet, observations), a brief description of the information that would be sought from each source, target informants for each data collection source, and the rationale – in relation to the key issues on trust development and SCM practices - for seeking information from such sources. Three different interview guides were prepared: interview guide for supply chain managers, interview guide for MC's project team and

interview guide for SCs (see Appendix B). This case study protocol was employed across all four (4) cases to ensure a consistent and systematic data collection process.

The case study database described in section 4.4.1.2.3.1 was used to achieve the second reliability strategy. All raw data i.e. documents, interview transcripts and field notes were integrated onto a single database that was created with qualitative data analysis software NVivo version 9. The codes generated from these data sources alongside memos created during the data analysis process were all stored in this database. This contributed to ensuring transparency of the data analysis process whilst ensuring that final themes, categories and codes could easily be queried back to the original data sources in NVivo.

4.4.1.3 Preliminary Workshop

Patton (2001) revealed the increasing popularity of collaborative strategies in qualitative research where participants can be incorporated into different stages of the research process such as research design, data collection and analysis, report writing and dissemination stages. Sage *et al.* (2012) demonstrated the importance of a collaborative research strategy through their use of informal conversations and biannual collaborative steering group meetings to investigate how strategy was enacted in a large UK construction firm. Their view was that collaborative research strategies were required to challenge usual assumptions that researchers can only develop insights ‘about’ rather than ‘with’ research participants. Such a collaborative data collection strategy stimulates greater awareness that alleviates to an extent, the mistranslation and misunderstanding in industry-academic discourse (Seidl, 2007).

Based on such insights, a preliminary workshop on SCM from a MC’s perspective was arranged with one of the case study organisations. The workshop, which involved seven (7)

participants as shown in Table 4.3, comprised two sessions. For the first session, participants were divided into two groups to discuss and list the pros and cons of implementing strategic SCM. Lists from the two groups were compared to ascertain participant views on the rationale for implementing SCM. The supply chain manager commenced the second session with a workshop presentation on their SCM strategy as well as subsequent discussions (questions and answers). The aim was to discuss issues relating to their SCM practice and how inter-organisational trust manifested from this practice. This was to evaluate the relevance of the study from an industry perspective, and to identify areas that could be explored during actual interviews. There was also further opportunity to discuss interview questions with the supply chain manager and obtain suggestions where necessary regarding how terminologies could be rephrased to ensure that these were better understood by project level personnel.

Table 4.3: Preliminary workshop participants

Participant organisation	Participants
Alpha	<i>Regional supply chain manager</i>
University of Wolverhampton	<i>1 professor of construction law; 3 senior lecturers in quantity surveying and construction management; 1 researcher in construction logistics and 1 researcher in supply chain management.</i>

Some of the issues that were explored during the workshop include 1) their SCM policy; 2) rationale for implementing SCM; 3) SCM IT support system and how this is used by project teams on site; 4) SCM categorization structure. It became evident from the workshop discussions and presentation that the MC's SCM strategy was also viewed as a mechanism for promoting trust with their supply chain. As findings from the same MC (Alpha) that organised the workshop have been discussed in chapter five, analysis of data from the preliminary workshop has been integrated into that chapter.

4.4.2 Data collection Phase

The key sources of data collection that were adopted in this research were 1) passive observations; 2) semi-structured interviews and 3) documentary analysis. Details of these have been summarized in Table 4.4.

Table 4.4: Sources of data across four case studies

	Case Alpha	Case Beta	Case Gamma	Case Delta
Semi-structured interviews	(1) supply chain manager, (3) contractor project personnel and (7) subcontractor personnel	(1) chief quantity surveyor, (2) contractor project personnel and (4) subcontractor personnel	(1) procurement leader, (6) contractor project personnel and (5) subcontractor personnel	(1) procurement manager, (2) contractor project personnel and (6) subcontractor personnel
Non-participant observations	Two (2) pre-start meetings	X	One (1) subcontractor performance review meeting	X
Documentary analysis	Workshop slides, workshop notes, subcontractor procurement guidelines, project description document, subcontract package list and procurement status	Company profile document, supply chain policy document, subcontractor status list	Company profile document, project description documents	Project and organisational profile documents, supply chain management strategy document, supply chain development report

X: was not possible to conduct due to access restrictions

4.4.2.1 Passive Observations

As part of the case study design, passive observations were undertaken to explore MC and SC interactions during the projects. These observations were to be triangulated with data obtained through interviews and documentary analysis. However, due to limited case study access, observations were only undertaken on project Alpha and Gamma. The researcher attended two (2) pre-start meetings on project Alpha and one (1) subcontractor evaluation meeting on project Gamma. Observation sheets with sections for descriptive and reflective notes were used to briefly record meeting discussions and other relevant observations. The

observations generally focused on two areas: 1) interactions between key MC and SC representatives during meetings with particular attention on performance and competency related issues and 2) general atmosphere during the meetings. Brief versions of field notes were initially produced during the meetings to avoid too much writing that could distract participants. Detailed notes with reflections were later written out after the meetings and word processed for subsequent coding and analysis in NVivo.

4.4.2.2 Semi-structured Interviews

Interviews are the primary source of data in interpretative case study research as this allows for participants' views and interpretation of actions and events to be gathered (Darke *et al.*, 1998). Due to the difficulties in exploring inter-organisational trust dynamics in the context of the MC's organisational supply chain using mainly observations, semi-structured interviews remained the primary data collection technique. Semi-structured interviews with MC and SC personnel were thus undertaken to explore the SCM process, the meanings they attached to trust and how it manifested and influenced behaviours during the projects. Engaging with both parties became very useful given the dyadic nature of the trust concept between the party 'being trusted' and the party that is 'trusting'. It was envisaged that the opportunity to seek views from both MC and SC personnel that were engaged together to deliver the project could yield deeper understanding on the subject.

Semi-structured interviews involve the use of pre-planned questions that are not necessarily asked in the same order as they are listed, but rather asked dependent on the flow of conversation during the interviews. Thus pre-planned questions (see interview guides in Appendix B) only served as a guide to ensure that all relevant questions were asked. Interesting issues that emerged were further probed as the interviews progressed, reflecting aspects of what Stake (1995) referred to as progressive focusing. For each case study, at

least one personnel responsible for setting the SCM strategy was interviewed at the head office so as to understand their SCM process. Participants were thereafter interviewed at the project level (see details in Table 4.4). In total, 15 personnel from the MC's organisation were interviewed across all four case studies.

Regarding SC selection for interviews, there was the need for within-case sampling as approximately 30 SCs were involved across each of the case study projects. Mason (2010) highlighted the issue of diminishing returns in qualitative research whereby after a certain threshold (theoretical saturation), more qualitative data does not necessarily yield additional insight. Thus SCs had to be sampled on each project for interviews until this point of theoretical saturation was noticed (see Ritchie *et al.*, 2003; Green and Thorogood, 2004). To achieve this, project managers across the four case projects were made to compile a list of major subcontract packages by contract value using SC information sheets that had been designed as part of the case study protocol (see sample in Appendix B). Details of ten (10) SCs on average were provided across each project and it was with these that contact was made to negotiate suitable times for interviews to be conducted.

The initial plan was to interview as many of these shortlisted SCs until a noticeable point of theoretical saturation was reached. However, some SCs declined participation due to their busy schedules whilst in some instances, interview appointments had to be rescheduled on a number of occasions. Despite these challenges, 22 SC personnel were interviewed across all four projects. These comprised M&E, carpentry and joinery, roofing, structural steel, demolition SCs.

Altogether, 39 semi-structured interviews were conducted across the four case studies, comprising eleven (11) from Alpha, seven (7) from Beta, twelve (12) from Gamma and nine

(9) from Delta (see details in Table 4.4). Except for three of the interviews that could not be audio recorded due to decline of consent, all other interviews were audio recorded with a digital recorder. These were subsequently transcribed verbatim and analysed using qualitative analysis software NVivo version 9.

The key issues that were discussed during interviews with the MC's project personnel were:

1) how they manage their supply chain SCs within the context of their SCM practices; 2) how trust develops in the supply chain during the project; and 3) how trust influences behaviours of supply chain representatives and any links of such behaviours to project performance outcomes. Regarding SCs, the main issues that were interrogated were: 1) how they perceive the MC's SCM practices; 2) how trust develops in the supply chain and 3) how trust influences their behaviour and that of the MC's personnel and any links of such behaviours to project performance outcomes.

4.4.2.3 Documentary Analysis

Documentary analysis was undertaken to obtain important background information on case study organisations (company profile), their SCM strategy, details of SCs on the case study projects, and project background information (project profile). Documents that were gathered from across the four projects have been summarized in Table 4.4. These were imported into NVivo for subsequent coding and analysis.

4.4.3 Data Analysis Phase

The data analysis phase involved two main stages: 1) within-case analysis and 2) cross-case analysis.

4.4.3.1 Within-case Analysis

Within-case analysis was undertaken to gain in-depth understanding of each case. This began by importing data from each case into NVivo. The imported data comprised interview transcripts, field notes and relevant documentation from each case (see Table 4.4). The three-pronged strategy of qualitative analysis proposed by Miles and Huberman (1994) was adopted i.e. data reduction, data display and conclusion drawing or verification. The within-case analysis therefore involved these three processes.

4.4.3.1.1 Data Reduction

Data overload has been described as a prominent problem in qualitative research (Miles and Huberman, 1994; Strauss and Corbin, 2007) especially given the cumbersome nature of words as compared to numbers. The qualitative data analysis process begins with data reduction where according to Miles and Huberman (1994), textual data is abstracted through sorting, focusing, discarding and organising large segments of data by denoting them with codes. Coding is a process of assigning labels to segments of text based on their descriptive or inferential meanings (Bryman and Burgess, 1994; Miles and Huberman, 1994).

After initial familiarisation with the transcripts, field notes and relevant documentation, open coding began by coding openly (free nodes) in NVivo version 9. Some of these open codes (free nodes) emerged from the transcripts (in-vivo codes) whereas other codes derived from conceptual sense-making as well as from the literature. Table 4.5 shows examples of codes that were assigned to sample segments of data. These free nodes were continuously revised and sometimes merged with others as the coding progressed and a clearer picture began to emerge from the data. Tree nodes were further created as patterns began to emerge from the coding process. To achieve this, free nodes were clustered under emerging themes, sub-themes and categories to depict patterns in the data (pattern coding).

Table 4.5: Example of data extracts showing applied codes

Data Extract	Coded for:
You know, you are only as good as the gangs that you've got working for you and so while a subcontractor may well have done six brilliant jobs for you, if they've got or introduced a poor gang into their business and they are the ones that you end up getting on your site, then that can affect you.	<ol style="list-style-type: none"> 1. Competence in performing tasks 2. Gang that turn up on the project
So it is your gut feeling and your confidence of what they do. And sometimes, you get that off the supply chain[IT system], 'cos they'll have a good history of jobs that they've done with us, or sometimes they'll be unknown and you just think, well, we've got good references from all the contractors and the meetings that you've had with them, you feel that they'll do a good job for you.	<ol style="list-style-type: none"> 1. Competence in performing tasks 2. Trust from information on IT system 3. Gut-feeling 4. Third party organisations 5. Impressions from first-time interactions

To illustrate this analytical process with a typical example, five themes and 36 sub-themes along with their respective categories were initially generated on trust in the MC's supply chain as shown in Figure 4.3. These derived from codes that had been built up based on interpretation of descriptions relating to what trust meant, how it developed in the supply chain, who was being trusted, who was trusting, what consequences trust had during the project and factors that were inimical to trust development. Codes identified as constituting mechanisms employed to gain knowledge and information about the trustee were for example clustered under 'knowledge and information'. This became a category that was later clustered under cognition-based trust as shown in Figure 4.4 because the interpretative process revealed that such 'knowledge and information' formed a basis for developing psychological expectations that were impersonal and rationally grounded. Cognition-based trust was then further clustered as one of the sources of trust and became one of the three sub-themes under 'nature of trust' as can be seen in Figure 4.5.

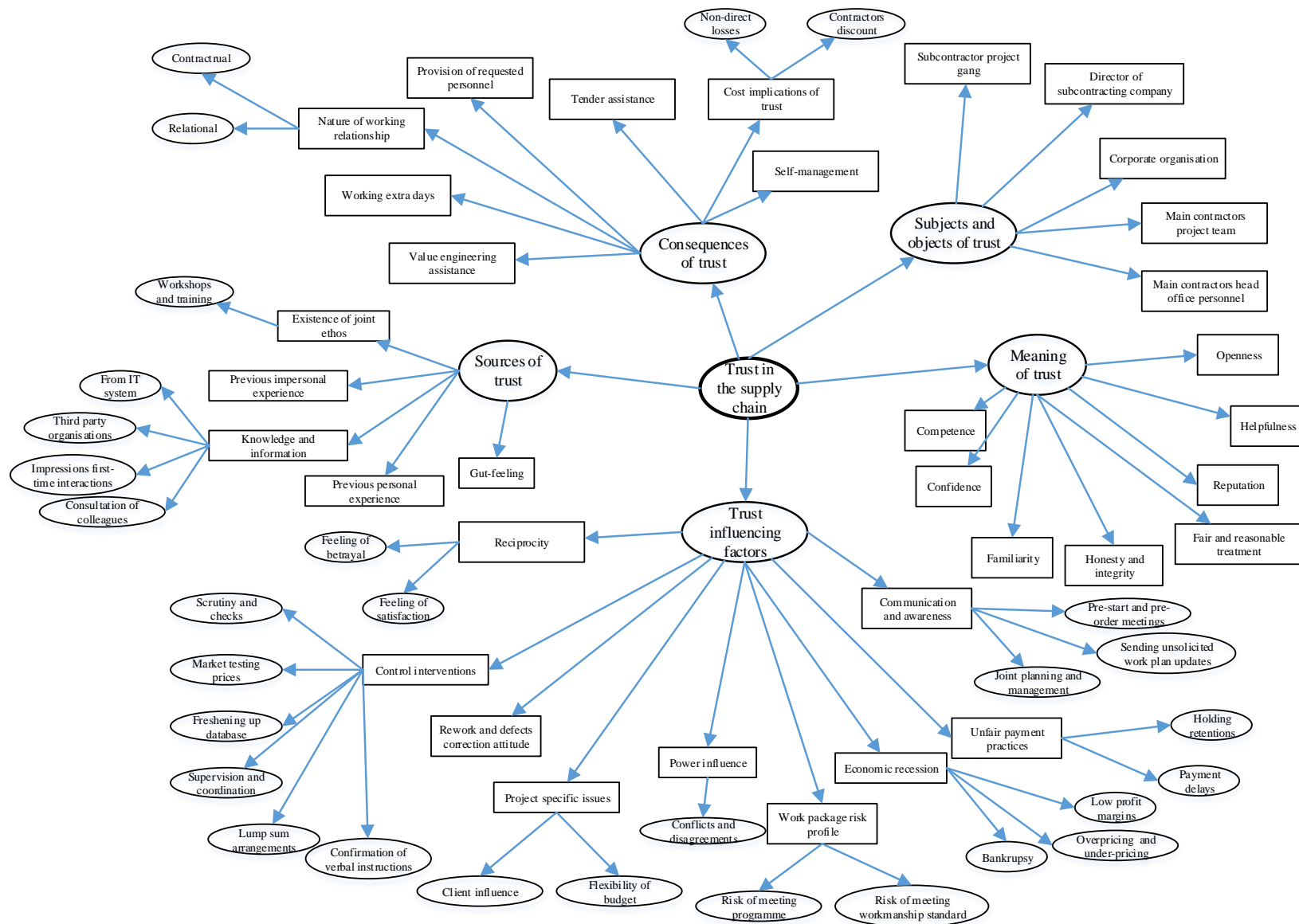


Figure 4.3: Initial thematic map on trust in the main contractor's supply chain

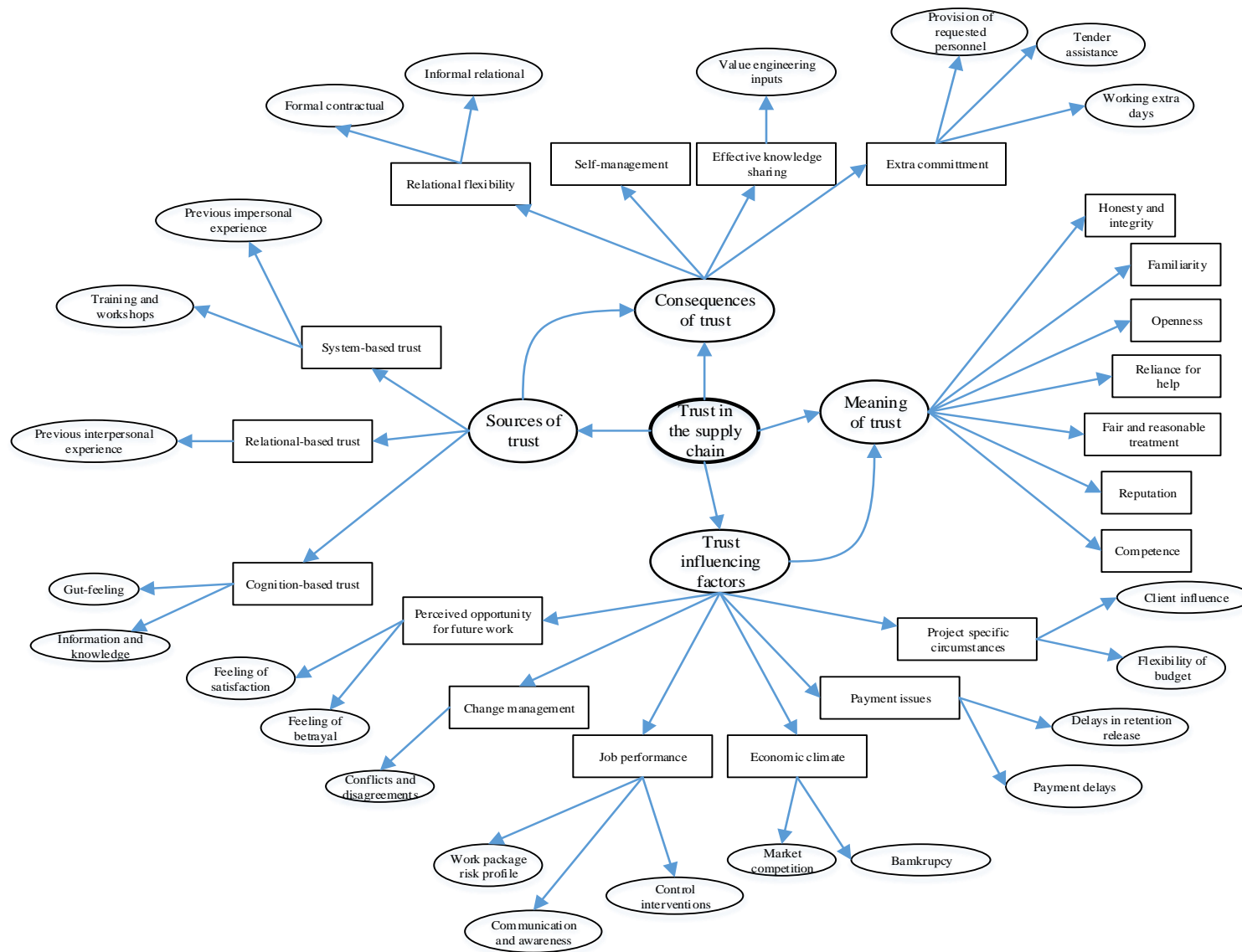


Figure 4.4: Developed thematic map on trust in the main contractor's supply chain

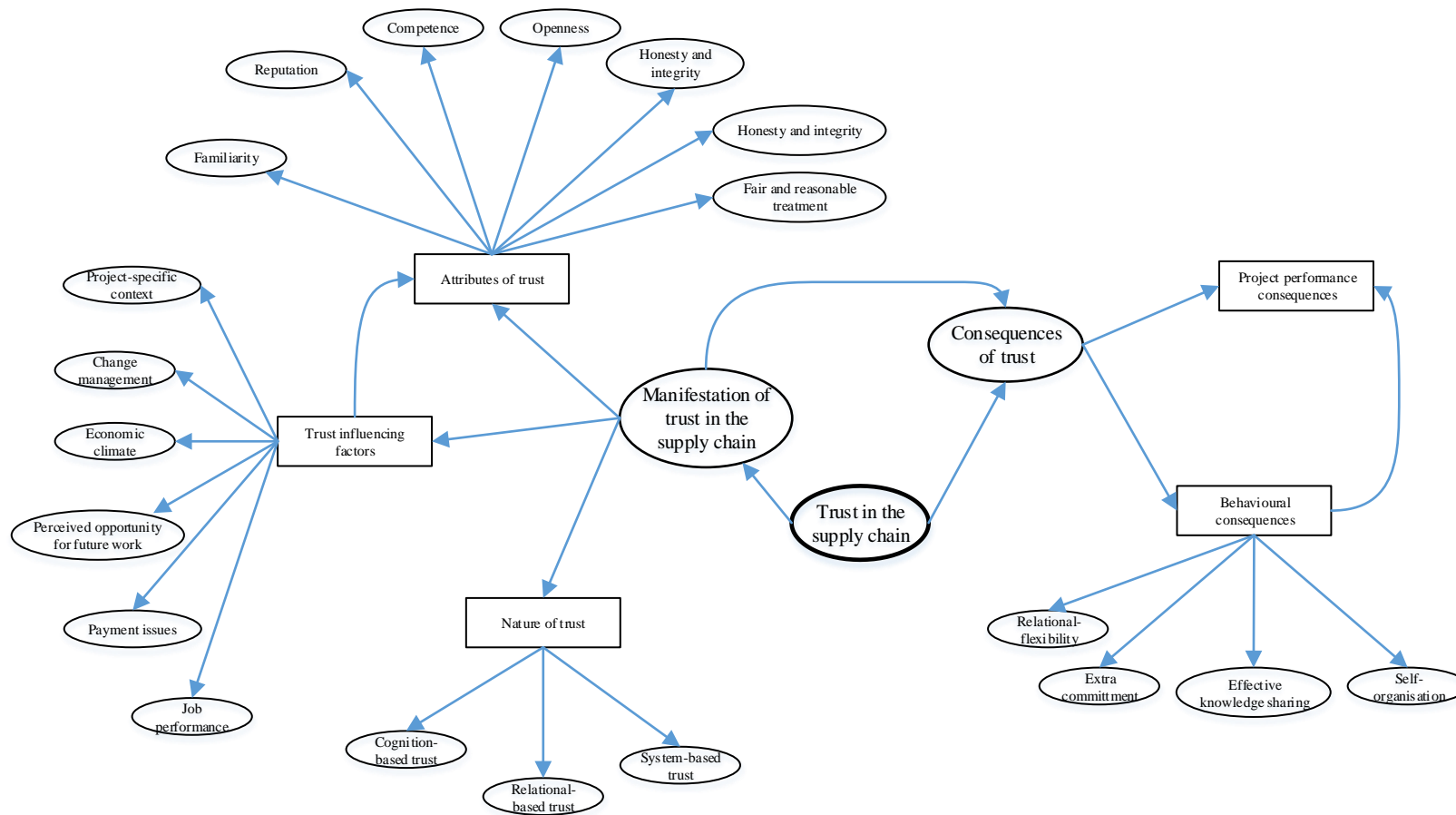


Figure 4.5: Final thematic map on trust in the main contractor's supply chain

Similarly, the cost implications of trust which in Figure 4.3 comprised of two codes: ‘non-direct losses’ and ‘contractor’s discount’ reflected instances when losses were conceived as a deliberate demand for discount by the project team during negotiations or when these had accrued from non-direct compromising decisions that were made to demonstrate goodwill. These two codes which were later recoded as ‘future business investments’ as the interpretative process revealed that SCs considered such losses as benevolent actions that could translate into future work opportunities. This code was further subsumed into the ‘informal relational’ dimension of ‘relational flexibility’ as shown in Figure 4.4. This was after it had become apparent through the interpretative process that SCs associated such losses with the level of informality in the supply chain relationship. Relational flexibility was later categorized as a behavioural consequence of trust which fed into the theme ‘consequences of trust’ as shown in Figure 4.5.

Again, ‘work package risk profile’, ‘communication and awareness’ and ‘control interventions’, which were sub-themes in Figure 4.3, were clustered as categories under a new sub-theme labelled job performance (see Figure 4.4) when it became clear during the interpretative process that emphasis on these three categories were primarily concerned with achievement of satisfactory job performance targets during the project. Job performance finally became one of the six main categories of the theme ‘trust influencing factors’ as illustrated in Figure 4.5. Similar logic was applied to the conceptual aggregation process that resulted in the eight themes on strategic SCM practices of MCs illustrated in the initial and final thematic maps in Figure 1 and 2 of Appendix C1 respectively.

Throughout this interpretative process, memos were continuously written (using the memo tool in NVivo) on any patterns observed in the data, which helped to keep track of the

conceptual clustering process. The final coding structure from the data analysis is presented in Appendix C4.

4.4.3.1.2 Data Display

Miles and Huberman (1994) described data display as an organised and compressed representation of information into a format that facilitates conclusion drawing, whilst also contributing to validity of the data analysis process. Data were organised into displays that were similar to the thematic conceptual matrices described by Miles and Huberman (1994). These matrices reflected emergent patterns across the data and were derived from running matrix coding queries in NVivo. The coding query outputs have been presented in Appendix C2 whilst the thematic conceptual matrices have been used to present case study findings in chapters five, six, seven and eight. The thematic conceptual matrices for cross-case comparisons have also been presented in Appendix C3.

4.4.3.1.3 Conclusion Drawing and Verification

Conclusion drawing and verification is the final stage of the data analysis process which Miles and Huberman (1994) described as the process of identifying patterns and causal flows in the data, seeking explanations and drawing the necessary conclusions. The themes relating to SCM practices for instance were compared against themes relating to trust manifestation so as to identify any relevant patterns. Emergent themes that related to SCM practices and inter-organisational trust were also compared against project attributes. There were also comparisons across the different groups (MCs and SCs) so as to explore if emergent views were similar or different. This process reflected the principle of pattern matching (Yin, 2013) whereby emergent empirical patterns were constantly matched with research questions to arrive at firmer conclusions.

This pattern matching process was undertaken using the matrix coding query tool in NVivo version 9 (see results in Appendix C2). Case study reports - which have been presented in chapters five, six, seven and eight respectively - were further prepared for each case.

4.4.3.2 Cross-case Analysis

Miles and Huberman (1994) argued that cross-case analysis is very important because it enhances generalizability within the context of the cases as well as deepens understanding. In this study, a cross-case analysis followed from the ‘within-case’ analysis to identify similarities and differences across the four cases and to seek explanations for any such differences. The thematic conceptual matrices that were developed during the within-case analyses were merged together to facilitate cross-case comparisons across the various themes. These merged displays enabled easy identification of patterns across the four cases and hence the drawing of firmer conclusions. The cross-case analysis report, which is presented in chapter nine was also merged with discussions that sought to explain within-case and cross-case findings by relating these to previous literature on SCM and inter-organisational trust.

4.4.4 Framework Development and Evaluation Phase

The final phase of the research process as shown in Figure 4.2 was the development of a SCM oriented trust engendering framework based on cross-case findings. This framework comprised key SCM practices of MCs that emerged to have influenced different dimensions of inter-organisational trust, the behavioural consequences that derived from these trust dimensions during the projects and the project performance consequences.

The aim of the framework was to help the MC’s project team and their SCM personnel understand implications of their decision making at both policy and project level. This

framework was subsequently evaluated from the perspectives of selected participants that were involved in supply chain related decision making. The objectives of this evaluation process were to identify the extent to which participants recognised the patterns abstracted from the data and any explanations of such patterns. It was further to assess the adequacy and completeness of the framework, to evaluate its simplicity and logic and its usefulness for guiding the MC's project team and supply chain management staff in selection and management of SCs for various work packages during projects.

To achieve this, individual meetings were arranged with five (5) target participants that were involved in supply chain related decision-making. These comprised three (3) personnel from Alpha, Beta and Delta respectively that were responsible for setting the supply chain strategy, one (1) project quantity surveyor from another major player in the UK construction industry that engaged in project level supply chain decision-making and one (1) contracts director for a SC that was part of the Alpha case study. A brief report that contained the proposed framework, accompanying recommendations and the cross-case comparison of SCM practices was given to the participants at the start of each meeting. This was followed by a 15 minutes PowerPoint presentation on research findings and then finally an interview session to elicit feedback. Feedback questions (see Table 1 of Appendix D) were used to obtain participant views on the framework (which consolidated the research findings) and recommendations.

These feedback interviews were audio recorded and transcribed for analysis (see Table 2 of Appendix D for feedback to responses). The framework development and evaluation process is presented in Chapter ten.

4.6 ETHICAL ISSUES

Ethical considerations must be made when designing case study research as it may often involve dealing with confidential information about an organisation or participant. Ethical considerations include informed consent, review board approval, confidentiality, handling of sensitive results, inducements and feedback (Runeson and Höst, 2009). In line with this, ethics procedures, guidelines and conduct in relation to confidentiality, anonymity, and integrity as stipulated by the University of Wolverhampton were adhered to. Ethics approval was sought from the Ethics Committee of the Faculty of Science and Engineering, University of Wolverhampton, prior to commencement of data collection.

Throughout the study, participants were also made fully aware of the research questions, aim and objectives and were subsequently asked to participate voluntarily by signing an interview consent form before each interview commenced (see Appendix B for sample of consent form). To ensure confidentiality and anonymity, false names were used throughout so that responses could not be linked to interviewees and case study organisations. This was to achieve assurances given to participants regarding the strictly confidential nature of the study. Assurances on secure data storage and destruction upon completion were also upheld throughout as only the researcher had access to the password protected computer on which raw data was digitally stored. This raw data would be safely destroyed after completion of the research.

4.7 SUMMARY

This chapter has discussed the latent philosophical issues that have implications for design and conduct of research. The philosophical positions of this research i.e. subjective ontological position, interpretivist epistemological stance and value laden axiological orientations have been argued. The choice of a qualitative research methodology for this

study and in particular a multiple case study design has also been argued after appraising different qualitative and quantitative research methods. The multiple case study design was chosen to facilitate a longitudinal type study within context that allowed for data source and methodological triangulation as well as the answering of predominantly ‘how’ and ‘why’ questions posed in this study.

A detailed description of the research process i.e. research design phase, data collection phase, data analysis phase and framework development and evaluation phase has also been presented. Regarding actual data collection, the use of multiple data collection methods i.e. passive observations, semi-structured interviews and documentary analysis during the study have been highlighted. These discussions have also taken into account issues of validity and reliability and how ethical standards were maintained throughout the study. The next chapter (Chapter Five) presents findings from the first case study project.

CHAPTER FIVE: CASE STUDY ALPHA

5.1 INTRODUCTION

The previous chapter discussed the research methodology and design adopted for investigating strategic supply chain management (SCM) practices of selected UK main contractor (MC) organisations and its influence on inter-organisational trust development. Having collated and analysed the data, this chapter presents findings that emerged from the Alpha case study. The background and findings on Alpha's SCM practices, trust manifestation, trust-influencing factors and the functional consequences of trust are discussed. This chapter contributes towards objective four of the research, which sought to investigate how inter-organisational trust manifests and develops within the context of MC SCM practices as well as its functional consequences.

5.2 CASE STUDY BACKGROUND

The case study background that includes brief information about the company, case study project description and background of research participants is required to ensure that findings are interpreted within the context of the case.

5.2.1 Company's Background

Alpha's operation in the UK dates back to 1874. They have since evolved into a multi-national construction group with several branches across Europe. Alpha is a major player in the UK construction industry and has consistently been ranked in the top ten of UK construction firms by annual turnover. Alpha's annual turnover is approximately £1.8b and they employ 28,000 personnel globally across different construction industry sectors. Alpha operates from a network of seven regional offices across the UK so as to foster closer collaboration with their local customers. Alpha's West-Midlands regional office participated in this study.

5.2.2 Case study Project Description

The Alpha project involved redevelopment of an existing civic centre building for a city council in the East Midlands region of UK. The existing structure - regarded as an iconic city centre building - was in dire need of redevelopment due to a maintenance backlog and an increased need of space for council activities. The client therefore chose to undertake a £30.5 million redevelopment. The redevelopment objective was to preserve the iconic external facade of the building and remodel the interior to meet modern standards and increased space requirements. Thus, the project comprised refurbishment and new-build works that were to be undertaken over 15 months contract period.

To achieve this, the inner courtyard of the existing structure was demolished to make way for the new-build section which comprised pile foundations (350 continuous flight auger piles), structural steel frames, precast concrete floors and single ply membrane roofing. The existing facade also required brick and stonework cleaning and window replacement. A small scale hydro plant and an adiabatic cooling system were to be installed to take advantage of a nearby river and at completion, the redeveloped structure was expected to meet an 'excellent' BRE Environmental Assessment Method (BREEAM) rating and an 'A' rated energy performance certificate. Alpha won the job through keen competitive tendering as a design and build (D&B) contract which increased the commercial sensitiveness of the project. When data collection commenced at the project level in February 2012, the work had advanced into the ninth month with 55% of construction activities completed. The project was sub-divided into approximately 29 key subcontract packages. A summary of the project characteristics is presented in Table 5.1.

Table 5.1: Characteristics of project Alpha

No.	Project characteristics	Project Alpha
1	Nature of project	Offices
2	Location of project	East-Midlands
3	Nature of works	Refurbishment and new-build
4	Type of client	Public client
5	Mode of contractor selection	Competitive tendering
6	Proposed project duration	15 months
7	Current stage of project	55% complete; Month 9
8	Procurement arrangement	Design and build
9	Contract form	NEC contracts
10	Contract sum	£ 30.5 million
11	Number of subcontract packages	29

5.2.4 Research Participants

Altogether, ten in-depth interviews which lasted approximately one hour each and one informal discussion were undertaken for this case study. An interview was first conducted with the supply chain manager at the head office to gain an insight into Alpha's SCM strategy and practices and how this influenced inter-organisational trust dynamics. This was after initial engagement with the supply chain manager during a preliminary SCM workshop (see section 4.4.1.3). Interviews were further conducted at the project level with both Alpha's project team and their SCs. At the project level, two (2) interviews and one (1) informal discussion were conducted with Alpha's project team whilst seven (7) interviews were conducted with key personnel representing the SCs. The background of participants is presented in Table 5.2. All research participants except Alpha's project quantity surveyor had more than 16 years of working experience in the construction industry and were mostly above the age of 41. The experience and respective roles in procurement and contract management related activities suggested that participants were suitable for the study.

Table 5.2: Research participants for case study Alpha

No.	Organisation	Position	Gender	Age (years)	Years of experience	Qualification
1	Alpha	Supply Chain Manager	Male	41-50	16-20	University degree
2	Alpha	Construction Manager	Male	41-50	> 20	University degree
3	Alpha	Project Quantity Surveyor	Male	30-40	4-6	University degree
4	Alpha	Senior Surveyor ¹	Male	41-50	> 20	University degree
5	Panelling subcontractor	Operations Manager	Male	41-50	> 20	HNC + NEBOSH Qualification
6	Tiling/mosaic subcontractor	Director ²	Male	51-60	16-20	Trade qualification
7	M&E services contractor	Project manager	Male	41-50	16-20	Trade qualification
8	Scaffolding subcontractor	Director ^{2,3}	Male	>60	>20	Trade qualification
9	Scaffolding subcontractor	Quantity Surveyor	Female	30-40	7-10	NVQ + IOSH
10	Carpentry/Joinery Subcontractor	Contracts Director	Male	30-40	16-20	University degree + ICIQB
11	Roofing Subcontractor	Contracts Manager	Male	41-50	> 20	NVQ

¹Informal discussion rather than a formal interview ²Directors were directly involved at the project level in managing the subcontract package ³Consent was not given for interview to be recorded so it was hand written.

5.3 SUPPLY CHAIN MANAGEMENT PRACTICES

From the analysis, strategic SCM practices of Alpha were abstracted into eight themes which are: 1) supply chain orientation; 2) supply base management; 3) supply chain assessments; 4) long-term relationships; 5) supply chain performance; 6) supply chain IT system; 7) continuous performance improvements and 8) supply chain motivation and reward. These practices are summarized in Table 5.3.

Table 5.3: Supply chain management strategy of Alpha

Features	Alpha's SCM strategy and practice
Supply chain orientation	<ul style="list-style-type: none"> To reward contractors who perform well with more work, and to reduce opportunities for contractors to perform badly on projects. Subcontract about 90% of workload annually Coordinated by a supply chain manager
Supply base management (size, classification & connectedness)	<ul style="list-style-type: none"> Approximately 5000 subcontractors used per year nationally. Large supply chain base with classification of supply chain into four categories. Well-structured with allocation of contact persons to each subcontractor Subcontractors well informed of their status on the supply chain at any given point.

Features	Alpha's SCM strategy and practice
Supply chain assessments	<ul style="list-style-type: none"> • <i>High level of connectedness* with top category** subcontractors. Level of connectedness decreases further down the categories.</i> • <i>Supply chain interviews and audits on health and safety, design, employment policy, financial stability and contract terms.</i> • <i>Collection of necessary references, commercial checks and office visits where necessary.</i>
Long-term relationships	<ul style="list-style-type: none"> • <i>Approximately 50% of subcontract orders placed with top category subcontractors nationally</i> • <i>Formal long-term subcontract agreement signed with only 'category one' subcontractor's.</i>
Supply chain performance	<ul style="list-style-type: none"> • <i>Performance scoring on H&S, standard of work, compliance with programme, contractual cooperation, financial cooperation, supervision of work and design input where applicable.</i> • <i>H&S scorings revealed and discussed with all subcontractors on the project whilst other scores are only revealed and discussed with 'category one' subcontractors.</i> • <i>Performance scores are continuously updated on IT system</i>
Supply chain IT system	<ul style="list-style-type: none"> • <i>Bespoke easy to use IT system developed by in-house team.</i> • <i>Holds subcontractor trading information, supply chain status, project preferences, subcontractor performance scores and supports e-tendering.</i> • <i>Holds details of key contact person for each subcontractor on the database</i>
Continuous performance improvements	<ul style="list-style-type: none"> • <i>Annual review meetings with 'category one' subcontractors to discuss performance, set improvement areas, air both positive and negative aspects of the agreement and develop greater understanding and trust with subcontractors through improved communication.</i> • <i>Allocation of contact person to each subcontractor.</i>
Supply chain motivation and rewards	<ul style="list-style-type: none"> • <i>Annual best performing subcontractor award.</i> • <i>Tendering priority based on subcontractors supply chain status.</i> • <i>30 days payment arrangement.</i>

*Meeting once a year at management level to discuss progress of supply chain relationship ** see section 5.3.3 for details of categorization structure

5.3.1 Supply Chain Orientation

Alpha typically sublet approximately 90% of their workload to SCs, making their selection and management paramount for achieving project success. The construction manager explained that because Alpha does not actually build anything, their responsibility during the project is to select the right SCs, and manage them to build efficiently, productively and correctly. Alpha therefore has a SCM department, coordinated by a supply chain manager with other SCM personnel that are responsible for setting out the SCM strategy and engaging strategically with SCs. One SC for instance acknowledged the well-structured nature of Alpha's SCM practice:

"...they [Alpha] have a face in their supply chain, they've got [supply chain manager] who involves himself with the subcontractors, which I think is a positive

thing to have and they denote you with a person, like a single point of contact you have that is, basically, your contact if anything goes wrong, though not a lot of companies have that. So it's got structure and I think it certainly seems to work better than most of the other companies out there" - **Contracts manager, Carpentry & joinery SC**

Evidence from the preliminary SCM workshop and interview with the supply chain manager revealed that the underlying motivation of Alpha's SCM strategy was to reward SCs that performed well whilst limiting opportunities for bad performance.

5.3.2 Supply Chain Assessments

SCs have to undergo rigorous supply chain assessments before they are registered onto Alpha's supply chain database and thereafter awarded work on a project. This assessment was usually initiated through meet-the-buyer events when SCs were required from a local area. This process was explained by the supply chain manager:

"..if we've got our job in an area, local companies will contact us and those that are suitable will often be given an opportunity, they then go through the normal procurement process where if we haven't used them before they are high risk, we will look for references, we will do commercial checks, we will visit their offices, so they're further checked but it isn't in a way to exclude them. It's a way to check that they are viable for the project"

The above statement reveals the rigorous checks that Alpha undertakes when a SC is considered high risk because they have never worked on their project. These checks are used to gain an understanding of how SCs run their business (visiting their offices), their financial standing and their technical competencies.

5.3.3 Supply Base Management

Alpha's supply chain base consisted of approximately 5000 SCs that are employed annually across different projects. These SCs were categorized into four levels on the database. SCs

on the highest level (limited to approximately 250 across the UK) were those that had developed a long standing relationship with Alpha over the years, contributed strategically to their business and were recognised for their exceptionally high performance. The categorization system was explained by the supply chain manager:

“...each region looks at which subcontractors have worked well for them and those that have done very well become category 2 subcontractors. That’s about 20% of the supply chain. From the 20%, its analysed who are the main people working for us and through an interview process, a relationship is built and an agreement put in place that we’re going to try and work closely together and those people that achieve that and also pass an audit of our documentation and standard become category 1. Everyone else is a category 3 and category 4’s are people that we haven’t used before”

Formal supply chain agreements were thus only signed with the ‘category one’ SCs. Interviews with SCs also revealed that they were very much aware of their present categorization status on Alpha’s supply chain database as well as privileges associated with each status. They were therefore always keen to either work harder to attain or maintain the highest status (category one).

5.3.4 Long-term Relationships

Alpha emphasised the development of long-term relationships with their ‘category one’ SCs by signing an agreement to work closely together. This ambition was highlighted during the supply chain workshop where it was revealed that ‘category one’ SCs were given the opportunity to price every upcoming work. Table 5.4 reveals that on the average, 54% of orders were placed with ‘category one’ SCs in 2012 and this percentage is much higher (84%) for the Midlands Region. This demonstrates Alpha’s focus of promoting long-term supply chain relationships with their ‘category one’ SCs.

Table 5.4: Orders placed with ‘category one’ subcontractors in 2012

	Total orders (£ ‘000)	Orders placed ‘category one’ (£ ‘000)	Percentage spend with top category (%)
London	53, 516	35, 429	65.20
Western	26, 473	15, 682	59.24
Midlands	45, 472	38, 394	84.43
North West	20, 632	6, 645	32.21
North East	38, 548	19, 472	50.51
Scotland	56, 501	27, 819	49.24
South East	65, 973	23, 353	34.40
National Average	43, 874	23, 828	54.31

Source: Supply chain management workshop, 27/01/2012 at Alpha’s Midland office.

5.3.5 Supply Chain IT System

Alpha’s SCM process was supported by a bespoke supply chain information technology (IT) system. The IT system was a database that held records of previous performance; spend levels and other important SC documentation such as agreed terms and conditions, H&S documentation, insurance documentation, project preferences and organisational structure. The IT system provided the project team with adequate information that was required to place orders with the right SC during a project. The supply chain manager made this remark about their IT system:

“...it’s been invaluable in trying to give the right tender opportunities to the right subcontractors. So just having that database, has made us far more professional of how we approach a project. A good example will be knowing exactly the size of steelwork that a subcontractor has done recently in a certain area - is very valuable when you’re tendering future work with certain size of steelwork. We then have against all the companies, key contacts so to discuss a project, instead of trying to work out where they’re based and who should I speak to, it tells you exactly who to speak to”

The above statement reveals the functional nature of Alpha's supply chain IT system and how this supported their engagement with respective SC personnel during tendering and placement of subcontract orders at the project level.

5.3.6 Supply Chain Performance

The performance of SCs on any of Alpha's project was regularly rated by the project team. The supply chain manager explained that each project site scored SCs four times a year and these scores were directly logged onto the supply chain database by the site management team. This was to ensure that anyone within Alpha could review performance scores of SCs on live projects. Performance scoring was undertaken on different aspects i.e. H&S, standard of work, compliance with programme, contractual cooperation, financial cooperation, supervision of work and design input (where the SCs work involved a design element). These performance scores were however not disclosed to the SCs during the project.

5.3.7 Continuous Performance Improvements

Alpha promoted continuous performance improvement (CPI) activities within their supply chain. There was formal arrangement for 'category one' SCs to meet with Alpha's personnel once in a year. During these annual supply chain review meetings, Alpha provided feedback on how they think their 'category one' SCs had performed as well as areas where they thought they could improve. This annual review meeting was considered beneficial for developing the strategic supply chain relationship. A 'category one' SC explained how such engagements had helped them develop as a company over the years especially with regards to the H&S aspects of their performance.

“...that helps us with all our other main contractors as well, which has been a massive assistance...and it does tend to focus on Health & Safety, 'cos that's their priority. Improving us as a company on the whole, they're probably the leaders and

they've probably influenced our policies as a small company there in that area more than anybody else - **Contracts director, Carpentry & joinery SC**

These strategic interactions thus created knowledge exchange channels that contributed to operational improvements although it was only limited to 'category one' SCs. Alpha's construction manager was of the view that a lot more had to be done to engage with their SCs broadly and to create two-way learning and knowledge exchange channels whereby Alpha does not only contribute to SC operational improvements, but could also learn from their (SC) specialist experiences. The construction manager remarked:

"... we don't actually discuss with our subcontractors, so what I'm saying here is that, not just on a particular job, but generally, what new can they bring to the marketplace that we can use in the future? We're not actually close enough to them to be able to do that, we need to be closer to understand that, that the piler, the steel erector, how he's working generally around the country and sharing that knowledge more, we don't do that either"

This statement highlights the need for Alpha to perhaps engage more closely with SCs on their different categorization levels so as to learn from experiences they acquire working with other MCs across the UK. The supply chain manager for instance had earlier intimated the need and desire to engage more with their supply chain SCs through workshops to understand their building information modelling (BIM) capabilities. Perhaps such workshops, when implemented, could provide that environment for two-way learning and knowledge exchanges.

5.3.8 Supply Chain Motivation and Rewards

Alpha motivated their supply chain SCs through the promotion of fair payment practices, an annual best SC award scheme and continuous work opportunity. They had in place a 30 days payment arrangement with their SCs, which the supply chain manager considered the

friendliest in the UK construction industry context. The annual best SC award was also used to reward SCs for exceptional performance and coincidentally, the scaffolding SC on the Alpha project who had just been a beneficiary of this annual award made this remark:

“..We won subcontractor of the year, like I say, we’re very recognised...We were just so proud as a company, ‘cos there are some huge companies that are Cat 1 for [Alpha] ...they were having a joke that one subcontractor of the year one year won it and they didn’t get a job for three years after. I said ‘I hope that doesn’t happen to us’” – Quantity surveyor, Scaffolding SC

Clearly, the underlying motivation that derived from winning the award was the expectation that this recognition could translate into future work winning. This revealed that the most effective reward for SCs was giving them continuous work opportunities. The opportunity for repeat business was however prioritized for the ‘category one’ SCs as they were exclusively open to price for all upcoming work. The construction manager acknowledged that Alpha could do better to ensure continuity of work for their SCs, citing examples of other MCs that try to divide contracts up between for example, their top five groundworkers as an incentive to reassure them of continuous work during difficult periods. The construction manager further proposed other strategies that Alpha could explore to reward and motivate their SCs:

“I think that we should do more when it comes to, I suppose, rewarding our subcontractors and the way they work on site...I heard of one, I think it was where, if they get high safety scores, then their retention is halved at the end of the job. So, instead of we’re keeping three per cent, we only keep whatever, so there’s things that we can do better, without doubt”

This statement reveals the scope for Alpha to link retention arrangements with performance scores (especially H&S scores) as a strategy to incentivise their supply chain SCs to perform to the highest standards. This could motivate SCs particularly when performances to such high standards require extra efforts at additional hidden costs to their business.

In summary, this section has discussed the well-structured and coordinated nature of Alpha's SCM practices and the particular emphasis that was placed on 'category one' SCs with regards to CPI activities and supply chain motivation and reward.

5.4 MANIFESTATION OF TRUST

To understand how trust manifested in Alpha's supply chain during the project, views were sought from the different parties during the project about what they considered important with regards to trust (trust attributes) and the nature of trust that emerged amongst the different project delivery team members.

5.4.1 Trust Attributes

There were similarities and differences in the desirable trust attributes expressed by both Alpha's project team and their SCs. The views expressed have been summarized in Table 5.5. *Reliance for help, familiarity* and *honesty and integrity* were expressed by both parties during the interviews. The nature of help required was however unique to both party's needs. The construction manager explained that they expected SCs on their supply chain to assist them during tendering. SCs on the contrary expected to get help in the form of future work opportunities. A 'category one' SC expressed this attribute in relation to Alpha, in the statement below:

"...I think they do look out for us in a certain way and I think if we picked up the phone tomorrow and said 'look, we've got no work, we know that you've got a job coming up live,' I'm sure they would look at the best way of facilitating us, I'm pretty sure of that" - **Contracts manager, Carpentry & joinery SC**

Reliance for help was thus a common expectation for both parties that was linked to the status of SCs on the supply base (section 5.3.3) given that the higher the supply chain status

of a SC, the higher the help expected from each other. This trust attribute also reflected the reciprocal nature of trust.

There were however some differences in the desirable trust attributes expressed by both parties. The SCs emphasised *fair and reasonable treatment*, *reputation* and *openness*. In particular, *fair and reasonable treatment*, which was expressed by all the interviewed SCs, was concerned with being paid fairly for work done. This expectation was encapsulated a statement by one of the SCs:

“They have been very good, they have been very fair, I told them initially what we priced for and it was all itemised so they understood that and we have had quite a few extras on this job which they have been fair with again” - **Contracts director, Roofing SC**

The *reputation* attribute was also concerned with the expectation of getting paid as SCs considered Alpha to be a large and reputable company that could not easily go bankrupt. This gave them the confidence that Alpha were capable of honouring payments for work done.

Alpha’s personnel however emphasised *competence* as an important trust attribute which encompassed both technical competence and commercial performance. The supply chain manager made this remark, which sums up their expectations in SCs:

“...what we look for in using a subcontractor, they need to be competent, and with competence we look at past history with us on what they’ve built, H&S, their environmental, their labour and operatives, their management, we look at how competitive they are because we work in a competitive market place and we look at the relationship they have with us”

The above statement reflects that competence was not only about technical ability, but also the ability to deliver at the most commercially competitive rate.

Table 5.5: Trust attributes from Alpha and subcontractor perspectives

Trust expectations	Alpha	Subcontractors
Familiarity	<i>“those who have a relationship with us that has developed over a number of years”</i>	<i>“top of our list for trust, definitely just ‘cos we’ve worked with them for so long, so we know so many people within the company”</i>
Competence	<i>“they need to be competent”</i>	
Reliance for help	<i>“value engineering assistance and programme guidance” “helps us to win work by providing us with better quality tenders”</i>	<i>“looking out for us in terms of work opportunity”</i>
Openness		<i>“Open and frank discussions whenever there is a problem”</i>
Reputation		<i>“bigger contractors who’ve got the money and cannot easily go burst” “Being very good and very fair” “Understanding and being fair with extras” “being fair with the monetary, commercial side of things” “pay us on time when we put our applications in”</i>
Fair and reasonable treatment		
Honesty and integrity	<i>“that they would not exercise their opportunity on variations or something”</i>	<i>“I trust them because they’ll honestly expose me about their situation and say ‘we’ve only got budgets for this, this and this”</i>

5.4.2 Nature of Trust

The nature of trust that emerged during the Alpha project was revealed to encompass three trust dimensions: cognition-based, system-based and relational-based trust.

5.4.2.1 Cognition-based Trust

Cognition-based trust manifested most during instances where there was limited familiarity between the project team and SCs. In such instances, the team on project Alpha sought information on SC performance from their IT database when this was existent. When a SC had never worked on an Alpha project in the past, a rigorous supply chain assessment (see section 5.3.2), pre-order interviews and pre-start meetings were used to gain as much information on SC competencies. The project team in one instance visited another project to make enquiries from the MC about the performance of a SC. The emergence of cognition-based trust was illustrated in this statement:

*“...we’ll want to go on and meet them, sit down with them, get the drawings, or whatever, package is out, discuss the package and get an idea, a gut feeling, on the people that you’re dealing with at that point and how they kind of come across to you....so it is your gut feeling and your confidence of what they do. And sometimes, you get that off the supply chain [IT system], ‘cos they’ll have a good history of jobs that they’ve done with us, or sometimes they’ll be unknown and you just think, well, we’ve got good references from all the contractors and the meetings that you’ve had with them, you feel that they’ll do a good job for you - **Project quantity surveyor, Alpha***

This dimension of trust was conceived as a gut-feeling confidence that emerged during first-time meetings. This reflects the sense-making nature of cognition-based trust whereby project team members tried to get a fair idea or gut-feeling of how well unknown SCs were likely to perform (cognitively derived expectations). Such cognitive assessments were thus likely to be dependent on the experiential knowledge of the individual project team members, based on which they could reflect, make interpretations and form expectations from initial impressions and the information available.

5.4.2.2 System-based Trust

System-based trust was revealed as a form of confidence that emerged from the existence of a shared knowledge of working procedures, standards and policies. This was usually the case when a SC had worked with Alpha in the past. This view was expressed by the construction manager:

“...the subcontractor who’s worked with us a number of times before know exactly what we do, our procedures, and what to expect so they really synergise with our own procedures and policies...if a subbie wants to come on here, hasn’t got the same goals as [Alpha], then we won’t use them. If we do find out that they haven’t, then we need to change it very quickly”

Apart from ensuring synergy in terms of goal orientation, Alpha's CPI activities contributed to the emergence of system-based trust, particularly with H&S working practices. SCs were sometimes required to send their supervisors to a two day H&S course - when they did not have a recognised H&S training certificate - before their status could be upgraded on the supply chain database. This recognition that SC supervisors had undergone necessary training gave the project team some confidence (system-based trust) that they could manage their work package satisfactorily.

System-based trust also emerged from institutional arrangements (principal meetings, weekly progress meetings and financial meetings) that were in place for specific SCs to prevent any dispute over 'claims' during the project. The M&E SC on project Alpha for example had experienced a previous claims dispute with Alpha for which they (M&E SC) were struck off the supply chain database. Having been put back onto the supply chain through a successful tender on the Alpha project, the directors of both companies (Alpha and the M&E SC) agreed that regular principal meetings be held so they could talk through any issues that were escalated by the site teams. This was in addition to the weekly progress and financial meetings that were held by the site-based teams at the project level. Due to these arrangements, Alpha's project team expressed confidence in the M&E SC whilst admitting that they were a claims conscious SC. They expressed the view that such regular meetings prevented any claims dispute from re-occurring on the Alpha project – a typical case of trust repair through institutional arrangements.

5.4.2.3 Relational-based Trust

Relational-based trust manifested during instances where there was familiarity between SCs and the specific project team that run project Alpha. Here, confidence of the project team was not just underpinned by cognitively derived expectations, but also interpersonal

relationships that had been built up with the same SCs from previous successful projects.

This statement by the construction manager reflected this dimension of trust:

“I built up a very good relationship with several subcontractors...they’re the subbies I can trust to give me the right solution, give me the right price, give me alternative solutions and I know, ultimately, can be on site and do the job as well in the time period, supervise it and have the correct safety environment etc.

SCs that fell into this category were those that had long-standing relationships with Alpha which sometimes transcended across their various project teams. This view was also reflected by some SCs that had worked with Alpha for a considerable period. A ‘category one’ SC explained how they gradually transitioned from a systems-based to relational-based trust relationship:

“....the fact that we are a ‘category one’ subcontractor with them and they know who we are by name, they know pretty much most of the site team [SCs site team], they know me and have got my personal number so that they can phone me...once you’ve made that jump from, well we’ve done a couple of jobs now for [Alpha], this is probably a scenario we had five years ago, they’ve seen that there might be potential there for a relationship, we’ve seen it, we have a meeting and then off the back of that meeting then we’re showing how we need to become a ‘category one’...The trust levels then [5 years ago] were based on the ethos of the company rather than any particular site team - **Contracts manager, Carpentry & joinery SC**

The above statement reveals how relational-based trust emerged over a five year period of working together, which was linked to both the supply base management (see section 5.3.3) and long-term supply chain strategy (see section 5.3.4) of Alpha. Over this five year period, there was a shift from expectations that derived from confidence in company policy and ethos (system-based trust) to interpersonal relationships that were cultivated with different project teams as well as head office personnel at Alpha.

5.4.3 Subcontractor Selection

SC selection during project Alpha was a team-based decision that involved the commercial team, working in joint consultation with the design manager, project manager, construction manager and site manager. Firstly, the project team undertook risk analysis of different work packages, reviewed performance history of different SCs and consequently compiled a shortlist of potential SCs. Tender enquiries were then sent out to the shortlisted SCs, based on which a first stage analysis was conducted on purely commercial aspects of the tender. This enabled the project team narrow down their shortlist to two or three SCs who were then invited for pre-order meetings to discuss their tender figures. Considerations were given to trust-related issues during pre-order meetings as the project team had further opportunity to evaluate the SCs ability to deliver (cognition-based trust).

According to the supply chain manager, reviewing performance reports of SCs that had been used in the past (performance scoring and supply chain IT system), obtaining far more references and undertaking checks (supply chain assessments) when SCs had never worked for Alpha, and gauging SC capabilities (trustworthiness) during pre-order meetings, were all aspects of their supply chain practices that helped the project team make final selection – reflecting cognition-based dimensions of trust. Though this selection was a team-based process, the extent of emphasis placed on price seemed to however differ between Alpha's commercial and site management teams. The commercial team was more concerned with meeting allocated work package budgets, whereas the site management team sometimes preferred to go for more familiar SCs (relational-based trust) that had proven over time on previous projects. This tension (difference in emphasis placed on price) was explained by the project quantity surveyor:

“..I think if you speak to one of the site managers, they'll moan about certain subcontractors that we've placed, 'cos it probably might have been better,

commercially, for us, but on whole, it's not too bad, but there are certain packages that...site managers moan anyway, but because the budgets are so tight that we'll have a solution that works for our budget, but not necessarily...he's a subcontractor that we know of...if there are any issues, then they come back at us saying 'well, you chose the subcontractor.' That's why you try and have that joint agreement, they'll know what our pressures are, but we'll understand what they're trying to achieve"

This statement reflects efforts that were made by the commercial team to arrive at balanced decisions that met both budget and site performance requirements, knowing fully well the inherent risk profile of work packages.

Interestingly, SCs expressed the view that although relational-based trust could influence selection decisions, final decisions usually came down to commercial competitiveness and cognition-based aspects of trust except for when bids for shortlisted SCs were within a similar price range. The point at which relational-based trust influenced final selection decisions was clearly illustrated in this statement by one of the SCs:

"...to be realistic nowadays, the market place is tight, so it is down to money and it comes down to better engineering or other reasons than money when you're all within a very small band of each other. So if you have three suppliers and they're all within, let's say it's a £6million job, if you've got three suppliers and they're all within £250,000 of each other, then it's very easy then to say 'well I'm gonna go with this one'" - Project manager, panelling SC

The different views expressed by the interviewed SCs when asked the reasons for which they felt they were selected for their work packages have been summarized in Table 5.6 in the order in which responses were provided.

Table 5.6: Subcontractor views on selection criteria during project Alpha

Panelling	Tiling	M&E	Scaffolding	Carpentry & Joinery	Roofing
<i>We were cheapest price</i>	<i>We were commercially competitive</i>	<i>We were the cheapest price</i>	<i>Our ability to handle the complexity of the scaffolding within the tight programme</i>	<i>We made initial tender input that they wanted to retain</i>	<i>We're a local contractor</i>
<i>Project team had trust in us because we worked many times in the past</i>		<i>We provide better engineering</i>	<i>We were commercially competitive</i>	<i>'category one' status and personal relationship we have</i>	<i>Our high level of competence</i>
				<i>We were commercially competitive</i>	<i>We were commercially competitive</i>

In summary, Alpha's SCM practices contributed to the emergence of cognition, system and relational-based trust during the Alpha project, all of which influenced the selection of appropriate SCs during the project.

5.5 FACTORS THAT INFLUENCED TRUST DEVELOPMENT

The factors that influenced trust in Alpha's supply chain have been classified as: 1) change management; 2) economic climate; 3) project specific context; 4) payment issues; 5) job performance and 6) perceived opportunity for future work. These factors (summarized in Table 5.7) are further discussed.

Table 5.7: Factors that influenced trust in Alpha's supply chain

Factors	Alpha	Subcontractors
Change management	<ul style="list-style-type: none"> <i>Incomplete design and nature of the project resulted in numerous variations</i> <i>Day-works could not always be avoided although this was often a source of disagreements</i> <i>Formal procedures for managing change could not always be adhered to.</i> <i>Particular trades were more prone to variations which had to be carefully managed to prevent escalations</i> 	<ul style="list-style-type: none"> <i>Complexity of the project presented a major challenge for change management especially for particular trades</i> <i>Trust was easier to maintain with the site management team as opposed to the commercial team</i> <i>Project team were not always open about anticipated changes to scope of work during initial negotiations</i>

Factors	Alpha	Subcontractors
Economic climate	<ul style="list-style-type: none"> Increased opportunity to use new SCs based on weaker (cognition-based) trust Higher risk of SCs going bankrupt and the need for rigorous financial assessments 	<ul style="list-style-type: none"> Cash flow challenges due to lower margins Increased tendency of bankruptcy if cash flow difficulties were not properly managed
Payment issues	<ul style="list-style-type: none"> Prompt payment of SCs in accordance with 30 days payment policy Difficulty in reaching agreements on payment especially with highly variable trades 	<ul style="list-style-type: none"> Satisfaction with payment policy and promptness of payment in most instances Delays with aspects of payments due to disagreements and on-going negotiation of variation accounts Delays with release of retention which have to be chased up or traded-off during negotiations
Project specific context	<ul style="list-style-type: none"> Selection of some local and unknown SCs due to client requirement Tight budget and programme and complex nature of project presented challenges 	<ul style="list-style-type: none"> Tight budget and programme which presented challenges for change management and agreement on payment.
Job performance	<ul style="list-style-type: none"> Tendency for complacency with regular SCs regarding commercial competitiveness Market testing prices to ensure commercial SC competitiveness Tracking existing SC workload to avoid over allocation of work Performance scoring to keep track of current performance Sending out clear messages that no SC is guaranteed any work 	<ul style="list-style-type: none"> Keenness to perform satisfactorily on the project to continuously reaffirm supply chain status
Perceived opportunity for future work	<ul style="list-style-type: none"> SCs with higher expectations of future work prepared to accept more vulnerability during the project Giving future work opportunity to highest ranked SCs on database 	<ul style="list-style-type: none"> Acceptance of vulnerability based on perceptions of future work opportunity and offering extra assistance based on future expectations. Occasional feeling of betrayal when expectations of future work did not materialise.

5.5.1 Change Management

Although the use of day-works for valuing changes to work scope was discouraged and avoided due to the tendency for disagreements, it sometimes had to be relied upon because the design was still under development when work commenced on site. The project quantity surveyor indicated that whilst some SCs were keen for the opportunity to use day-works: intending to use this to their advantage, there were other SCs that wanted to avoid it altogether as it usually resulted in arguments and rifts. The project quantity surveyor also

explained that whilst there were contractual provisions for dealing with true variations, it was not always possible to adhere to such provisions due to the tight nature of the programme:

“...in a perfect world then, we’d have every variation measured and agreed beforehand and, thankfully, with the NEC contract, then these subcontractors who we have on a NEC subcontract have to conform to those rules, i.e. raising EWN – [early warning notices], raise a CE [compensation event] and then that CE gets approved. So, to a degree it works, but because of the pressure of the programme, some people get things done and then come back to us with a cost and it’s like what’s fair and reasonable really, so it’s negotiating the final account and going through the variations to see what is a viable variation and what isn’t”

The above statement revealed how the tight nature of the programme made it difficult to conform to formal (contractual) provisions for dealing with compensation events. The construction manager explained that scaffolding SCs were classic when it came to payment disagreements as there always had to be negotiations with them on money. The scaffolding SC claimed during the interview that there were still outstanding payment disagreements on the scaffolding package because it had gone over budget by a substantial amount. This was blamed on a lack of communication between Alpha’s commercial and site management team as the latter often gave them verbal instructions to proceed with changes.

The scaffolding SC further intimated that because they provide a framework for other SCs to work off (brickwork, glazers, M&E, roofing), variations to any of these other packages adds on a variation to the scaffolding works. This was in addition to unforeseen scaffolding works (handrails around open edges) that had to be provided for H&S reasons – making it particularly difficult to manage changes for the scaffolding work package on this complex project. The scaffolding SC claimed that this high tendency for their work package to always go over the MCs fixed scaffolding budget resulted in a negative mind-set about their

credibility (trustworthiness). Another SC expressed his feeling concerning the lack of openness sometimes during initial negotiations, which was attributed to some specific personnel within Alpha.

“It’s working through the project that sometimes you feel that you can be let down slightly....I think sometimes they know what’s gonna happen, but if they bought you in right from the start, they probably wouldn’t get the best out of you with the level of information, they’re probably better off dealing with you broad-brush, getting figures and orders dealt with and then going that next step and then you start with the hardnosed negotiating on variations. I’ve got certain people that I would trust and certain people that I wouldn’t. Even within the same company....But, as far as trust levels are concerned, I think they’re quite high.” -**Contracts manager, Carpentry & joinery SC**

These views from both SCs and Alpha’s project team provide a vivid account of how the change management process influenced inter-organisational trust during the project. There was the tendency for change related problems to result in disagreements that could consequently destroy the supply chain relationship although no such incident had occurred during the data collection period.

5.5.2 Payment Issues

According to the project team, Alpha’s 30 days payment policy (see section 5.3.8) was always adhered to except for aspects of payments for which there were disagreements. SCs generally acknowledged prompt payment from Alpha but raised concerns about the challenges of negotiating aspects of the payments to which there were disagreements. Delays were therefore inevitable in some instances. Another payment related issue that was highlighted by SCs concerned the prompt release of retention sums, although this was acknowledged to be an industry-wide problem that was not limited to Alpha. A typical view

that was expressed by most SCs whose work packages were subject to retention deductions is presented below:

“It’s scandalous, it’s absolutely immoral, wrong and it ought to be banned. Main contractors, not all of them, but main contractors hold on to your money as if it’s another discount and it’s sitting in their bank accounts and they’ll come up with every excuse under the sun to not pay you...in fairness, there’s probably a few that aren’t due. I understand that if they get a bad job, you see the unfairness of it, is it’s every contractor” - **Director, Tiling & mosaic SC**

The panelling SC further explained that whilst their motivation for going back to make good defects was to preserve their reputation and maintain their working relationship with Alpha, it seemed as though the retention deductions had become an industry accepted means for MCs to hold back five percent of their money as another form of discount. This SC was disappointed that they had to often chase owed retention amounts when these became due for release. Some SCs explained how they had to use owed retention sums from previous projects as a leverage when agreeing final accounts – a coping strategy that could only be possible if they had the opportunity to secure work on another project with Alpha. These retention-related problems and delays to aspects of payments to which there were disagreements therefore had negative implications for the honesty and integrity (trustworthiness) of Alpha from SC perspectives.

5.5.3 Economic Climate

A decline in the economic climate made it difficult for the project team to maintain regular supply chain SCs for all work packages although this would have yielded stronger (relational-based) trust. The construction manager explained:

“I think the biggest thing that can be done to manage the supply chain is actually to have fewer and work with them closely and actually negotiate jobs with them. The problem you have that, in this marketplace it’s difficult to do, but in the future, that’s

certainly the way that I'd like to see happening...you could say our biggest model [currently] is going out to the marketplace and using anybody we want really. It has worked, because we've been quite successful in doing it"

This view reflected the extent to which economic climate and specifically periods of economic decline limited the priority that was placed on relational-based as against cognition-based trust. Alpha had however been successful with this model because of their rigorous supply chain assessment process, which generated the levels of positive expectations (cognition-based trust) that in most instances were enough to achieve successful performance.

Another problem that was linked to the economic climate was the high tendency for SCs to go bankrupt during periods of economic decline. This made the project team place extra emphasis on financial stability of SCs during selection. The construction manager claimed they had only been lucky not to have recorded any incident of SC bankruptcy during the project although he acknowledged their effort to help some SCs whenever they raised concerns about cash flow difficulties. SCs also expressed views about how they had to cope with cash flow difficulties in the present environment, and the pressures on them to continuously meet constantly increasing performance requirements at lower margins. These views thus reflect the extent to which the changes in economic climate placed commercial strains on both Alpha and the SCs, making it difficult to promote relational-based trust in particular during the project.

5.5.4 Project Specific Context

The tight nature of the programme, restricted budget (project was won based on a keen competitive tender), the nature of the job i.e. combination of complex new build and refurbishment works were all project related factors that the project team claimed to have

presented trust-related challenges during the project. This was encapsulated in this statement by the construction manager:

“Well, this is a particularly tricky contract in the fact that it was a 63 week contract that was tendered in competitive conditions, so we knew that, from a money point of view, it was tight. The programme of 63 weeks was for a refurb job where you’re taking out the guts of the building and joining a new frame on, that is tricky as well”

These project specific issues presented enormous pressures on both the project team and SCs, contributing to other problems such as the change management and payment issues discussed above. Another project specific issue was the client’s recommendation for Alpha to employ some local SCs. The project team were thus compelled to sometimes search for good SCs in the local area that were otherwise unknown, contributing to the emergence of cognition rather than relational-based trust.

5.5.5 Job Performance

Job performance was expressed as the most influential factor on trust independent of relationship history. This was both with respect to technical performance and commercial competitiveness (trustworthiness). The senior quantity surveyor explained how they sometimes had to select SCs that were commercially competitive and technically competent even though these were otherwise known to be very claims conscious. This reflected the overriding priority that was placed on job performance. The project team further acknowledged the tendency for their highly rated supply chain SCs to become complacent with regards to commercial performance. Thus prices had to be subjected to rigorous market testing in addition to sending out clear messages to SCs that they were never guaranteed any job - irrespective of supply chain relationship status - unless they met commercial performance requirements.

The project team also acknowledged the influence of excessive workload on job performance irrespective of the high performance track record of a SC. Thus, they used their supply chain IT system to keep track of existing SC workload within Alpha, whilst also seeking information about existing commitments with other MCs during pre-order meetings. To avoid poor performance as a result of work overload, the work package size allocated to the carpentry and joinery SC had to be split up from £1.3m worth of work to £150,000 because they were already engaged on two other large projects (worth about £2m) with Alpha. This SC later expressed the view that the project team awarded them this rather small aspect of the work package on a supply and fit basis just to retain the specialist knowledge that they brought to bear at tendering stage.

The tracking of SC workload using the supply chain IT system, the emphasis placed on job performance during supply chain assessments and the performance scoring process undertaken on quarterly basis during the project (see sections 5.3.2 and 5.3.6) were SCM practices that reflected the priority placed on job performance as a trust-influencing factor. Accordingly, SCs were conscious of the reality that their current performance (technical and commercial) on the Alpha project was the most important factor for reaffirming their supply chain status.

5.5.6 Perceived Opportunity for Future Work

SC perceptions about the possibility of securing future work with Alpha influenced their trustfulness during the project. This manifested particularly when SCs had developed long-term supply chain relationships with Alpha.

“..since we’ve been a ‘category one’, pretty much guaranteed at least £1m worth of turnover...We know what they’ve got coming in their pipeline, which is another reason for being a ‘category one’, obviously you get exposure to that, we can then

build in to our business plan for any one year” - Contracts manager, Carpentry & joinery SC

The reason for this SC’s trustfulness as expressed in the above statement seemed to be based on the value i.e. £1m worth of work, that they knew could be derived from the supply chain relationship on an annual basis. This same SC had expressed general trustfulness towards Alpha although they felt some project team members were not always honest about potential changes to work scope (see section 5.4.1). This SC also recounted how they sometimes felt let-down when they had provided a great deal of tendering support to Alpha but were not subsequently selected for the actual job. It was explained that as long as they had the opportunity to discuss such disappointments at high level (during supply chain review meetings) and as long as they kept securing substantial work from Alpha on an annual basis, it was unlikely to destroy the supply chain relationship.

The extent to which SCs were confident of securing future work – which was linked to Alpha’s SCM strategy - thus influenced SCs trustfulness and hence inter-organisational trust development during the project.

In summary, Alpha’s SCM practices were connected to some of the factors that influenced trust development during the project in particular, the perceived opportunity for future work, payment issues, change management and job performance.

5.6 FUNCTIONAL CONSEQUENCES OF TRUST

Different trust expectations gave rise to behavioural consequences in the supply chain during the Alpha project as summarized in Table 5.8. These behavioural consequences; categorised as 1) effective knowledge sharing; 2) self-organising behaviour; 3) relational

flexibility and 4) extra commitment also influenced the achievement of satisfactory project performance outcomes.

Table 5.8: Functional consequences of trust in Alpha's supply chain

Behavioural consequences	Alpha	Subcontractors
Effective knowledge sharing	<ul style="list-style-type: none"> Value engineering and alternative working practices suggested by all SCs throughout the project irrespective of the prevailing nature of trust 	<ul style="list-style-type: none"> Motivated to share as much knowledge towards achievement of satisfactory project outcomes so as to maintain or improve supply chain status Sharing knowledge to demonstrate competence as this was regarded as bottom-line for maintaining trust
Self-organisation	<ul style="list-style-type: none"> Self-management capabilities demonstrated by all SCs and contributed to satisfactory achievement of quality and H&S performance Focus on self-management capabilities during vetting and pre-start meetings 	<ul style="list-style-type: none"> Keen to demonstrate self-management competencies throughout the project so as to build or maintain supply chain relationship
Relational flexibility	<ul style="list-style-type: none"> Relational-based trust and Informality with work packages that were highly subject to changes Relational-based trust and Informality with work packages that were very complex and critical to meeting the programme 	<ul style="list-style-type: none"> Informality throughout the project with change management and final account negotiations in the presence of relational-based trust. Made sacrifices based on future work opportunities that derived from relational-based trust
Extra commitment	<ul style="list-style-type: none"> Exclusive help from regular SCs with regards to tendering assistance. Request for specific supervisors to be on the job. 	<ul style="list-style-type: none"> Prioritising Alpha's activities due to high expectations arising from relational-based trust Commitment of specifically requested personnel to Alpha's projects Tender assistance

5.6.1 Effective Knowledge Sharing

Analysis revealed that both first-time and regular SCs were keen to share their knowledge and experience with the project team to ensure successful project performance on the Alpha project. The construction manager gave example of a novel input that was made by one of the first-time SCs. This contribution resulted in the use of a plastic walkway net system tensioned across steels frameworks around the atrium area, enabling the roofers to fix some glazing work without disrupting work activities in the atrium space below.

The roofing SC, working with Alpha for the first time (trust was cognition-based) provided an additional example of value engineering input that was made to improve the roofing work package:

“...I’ve even gone over and above the expectations on certain elements and I’ve introduced things which were not in the specs which I know was right. So it’s done absolutely over and above you know, there’s certain things in the specs which was fine, but I’ve introduced things over and above it to make it better. For example there was a multi ridgeline and I’ve introduced some fixing screws as well over and above that which the architect knows about and thinks it’s a great idea. But you know, I would have just done it as a spec but I want to put our stamp on this because this would be our flagship job for our roofing company” - **Contracts manager, roofing SC**

This SC was motivated to share their knowledge with the project team so as to gain recognition for exceptional performance, in hope that this could secure them a position on Alpha’s supply chain base. Regular SCs that had previous relational experience with the project team were also keen to make such value engineering contributions so as to assert their importance and maintain or improve their status on Alpha’s supply chain base. All SCs were aware that exceptional job performance on this present project was the bottom-line expectation of the project team that had to be satisfied and were willing to share any knowledge that enabled them demonstrate their highly specialist competence. Thus knowledge was shared in situations where trust was cognition-based, system-based and relational-based. Suggestions that emerged from such value engineering contributions contributed towards the achievement of satisfactory project performance outcomes that related to workmanship quality, cost performance, programme compliance and H&S performance.

5.6.2 Self-organisation Behaviour

During the Alpha project, the project team revealed how they had developed reasonable confidence in SC's ability to self-manage their work packages irrespective of whether trust derived from cognition, system or relational-based sources. This was because even when SCs were unknown, cognitively derived expectations (cognition-based trust) provided the project team with confidence that they could self-manage their work packages, having committed qualified and experienced supervisors to the project. It was observed during pre-start meetings how the project team were particular about SC's possession of good supervisors, good site management procedures, acceptable method statements and risk assessments. The construction manager for instance made this remark:

"...we have used new subbies on this job, those new subbies you take on board because of the location you're in, because you've had a recommendation from another site who've used them, off your peers and off your other project managers and they've done an interview and they've come across well. You do take a risk on them, but the subbies that we done that on here have worked fantastically well and they've delivered at the moment, y'know, the groundworker, the brickie, the roofer have all been new subbies to us on here...Obviously, at the end of the day, there's always a bit of luck there and a bit of risk...Touch wood, it hasn't been a problem on here"

The project team's confidence in SCs that worked on the Alpha project, irrespective of the prevailing trust dimension thus enabled them promote a project environment where SCs could demonstrate their self-organising capabilities, particularly with regards to H&S. The construction manager further explained how H&S was used to infer SCs self-management capabilities during the project:

"...It still comes down again to safety, because safety leads everything, and if they're managing their safety right, they tend to lead through with the rest. It tends to go through, because it sets a standard and it sets a technique for managing their own

men, so I think safety does not just do safety, it's sort of....used as a proxy to look at how they're managing other things"

Though this confidence was much stronger when trust was system or relational-based, such cognitively derived expectations (cognition-based trust) - linked to Alpha's supply chain assessments and pre-contract vetting process - were enough to promote an environment where SCs could self-manage their work during the project.

5.6.3 Relational Flexibility

The presence of relational-based trust promoted relational flexibility between the project team and SCs. The analysis revealed that interpersonal relationships that had developed over considerably long periods of time engendered informality in the supply chain relationship. This informality (relational flexibility) was particularly instrumental during negotiations on work packages that were highly subject to variations. The construction manager explained how this informality had been influential in negotiating the scaffolding SC's payment account, claiming that they (Alpha's project team) tend to also be more sympathetic to such SCs due to strong interpersonal bonds.

SCs that had cultivated relational-based trust with the project team also shared their experiences about how expectations of future relationship benefits made them relatively flexible and informal during the project. An explanation by a SC that had developed five years of relational experience with the project team clearly reflected this view:

"...there's a certain sense of ownership because they know that you're a 'category one', they can have a lot more influence over what you do, whereas if they've decided to give somebody new a run, then they're less likely to be able to put pressure on you...and it comes back to this discussion on final accounts, for instance, if a project manager wants me to do something for them, but he doesn't wanna sign an instruction for a certain value of money, he knows that I'll do the

work and that I'll have to negotiate my way through the commercial side of it after....so it's back to this informality. You do feel exposed, but you have got that safety net of 'if I've got nothing to do tomorrow, I'm coming to you, you need to find me some work' - Contracts director, Carpentry & joinery SC

This statement demonstrates the SC's acceptance of vulnerability (trustfulness) that did not emerge from Alpha's trustworthiness, but from the future value that was expected to be derived from the supply chain relationship as a 'category one' SC. The discharge of formal contractual provisions was thus traded-off for informal arrangements and negotiations, which was only possible because of the relational-based trust that existed in the relationship. This level of flexibility was however acknowledged by the SC to have some cost implications as they made commercial sacrifices. They however considered such commercial losses as an investment into the supply chain relationship.

Relational flexibility was also prioritized by Alpha's project team when they realized a work package was highly customized, complex or critical to the programme. This was because they were then fully aware of what to expect from such SCs as well as their ability to easily reach agreements due to the flexibility in the relationship. A typical example of this situation was given by the construction manager:

"...the biggest logistics nightmare was really the steel frame. That's when I've gone back to the old school, to somebody I know, [steelwork SC], who I know are excellent at planning, excellent at producing the design and excellent at erecting the steel in there, and they've done a fantastic job and I can't praise them enough. So, if I think there's a particularly tricky task, I come back to what we were saying before, the better the devil you know. I wouldn't have used a steel erector who I didn't know on this particular job, but because the brickworks or the groundworks is reasonably simple, yeah, that's who I've used. It's all about risk profile"

Priority was thus placed on relational history when the risk profile of a work package was considered as extremely high. During such high risk profile situations, the existence of relational-based trust and the flexibility that derived thereof became necessary for the achievement of successful project outcomes: cost performance, programme compliance, high workmanship standard and H&S performance.

5.6.4 Extra Commitment

Relational-based trust enabled SCs to demonstrate extra commitment as they knew this would be reciprocated by Alpha in the form of future work opportunity. SCs were prepared to go an ‘extra mile’ due to the strong confidence that derived from their relational experience - that Alpha would help them out with work opportunity if they were in a difficult position. Such SCs emphasised the exclusive priority they gave to Alpha because they knew that mutually acceptable solutions could always be reached on payments and other assistance during later negotiations. This behaviour had particular influence on programme compliance as without such extra commitments, work could sometimes have halted until payment disagreements were resolved. Such SCs further emphasised their willingness to also commit specific personnel that Alpha’s project team had requested for the project. It was observed during a pre-start meeting with the tiling and mosaic SC, how Alpha’s project team requested for a particular supervisor – which could only be possible because they were familiar with their working gangs.

Apart from during the project, this behaviour was also demonstrated at tendering stage. SCs that had a long history of working relationship and consequently relational-based trust were prepared to provide extra tendering support to Alpha. One of the SCs that had developed relational-based trust with Alpha made this remark:

“...we will always do their tenders for them and...he [company director] puts a lot of time and effort. He will do the specs for [Alpha] and we might not even win the job. He may put, like coming out of a whole weekend, mark up all the drawings, put the spec together, give it back to them,...so that’s how the trust has probably kept up over the years because he puts in a hell of a lot of his own time to do a lot for [Alpha] and sometimes we don’t win the work, which can be frustrating” – **Quantity surveyor, Scaffolding SC**

Thus it can be seen again how some SCs were still prepared to make extra commitments to preserve long-term supply chain relationships that had built up over several years, although there was sometimes an acknowledgement of disappointment. This disappointment did not however outweigh the long-term benefits or value that was expected to be derived from such strong interpersonal bonds – emphasising that their reasons for being trustful were dependent on the value that derived from their trusting response.

The inter-organisational trust i.e. cognition, system and relational-based trust that emerged from Alpha’s SCM practices resulted in behavioural and project performance consequences during the Alpha project, particularly amongst ‘category one’ SCs who were prepared to demonstrate extra commitment as well as maintain flexibility in the supply chain relationship due to relationally derived trust.

5.7 SUMMARY

This chapter has discussed the SCM practices of Alpha which were revealed as comprising a supply chain orientation, supply chain assessment, supply base management, performance scoring, CPI activities, long-term relationships and supply chain motivation & rewards. The different emphasis that Alpha’s project team and their SCs placed on trust attributes have also been discussed, all of which were influenced by Alpha’s SCM practices. Furthermore, three forms of trust: cognition-based, system-based and relational-based have been

discussed to have manifested during the project. These trust dimensions were also linked to different aspects of Alpha's SCM practices. In particular, the establishment of long-term relationships with their 'category one' SCs promoted relational-based trust whereas all the other features contributed to the manifestation of cognition and system-based trust. The various factors that influenced inter-organisational trust development during the project have also been discussed as: change management, economic climate, payment issues, project-specific context, job performance and perceived opportunity for future work. Some of these factors were linked to different aspects of Alpha's SCM process.

Lastly, the functional consequences of trust have been discussed. The three dimensions of trust i.e. cognition-based, system-based and relational-based helped to promote effective knowledge sharing and self-organising behaviour. However, relational-based trust in particular promoted relational flexibility and extra commitment, which were very essential for achieving satisfactory performance when work packages were considered to be highly complex, critical to the programme or subject to numerous variations. It has thus been revealed how Alpha's SCM practices influenced inter-organisational trust development and its functional consequences during the Alpha project. The next chapter (Chapter Six) presents findings from the Beta case study.

CHAPTER SIX: CASE STUDY BETA

6.1 INTRODUCTION

This chapter discusses results from the Beta case study. The first section outlines the case study background, which would be useful for interpreting findings within context. Beta's SCM strategy, trust manifestation and its functional consequences are further discussed. These discussions are intended to reveal the implications that Beta's SCM practices had on inter-organisational trust and its functional consequences during the project. This is in accordance with the research aim, which sought to investigate SCM practices adopted by selected UK MCs and its consequent influence on inter-organisational trust development. The chapter thus contributes to objective four of the research.

6.2 CASE STUDY BACKGROUND

To help interpret findings from the Beta case study within context, it is important to present the background of the organisation, describe the Beta project and provide some background information about the research participants.

6.2.1 Background of Company

Beta is a major player in the UK construction industry that was originally founded in 1908 but recently merged with another large UK construction group. Beta's parent company has consistently been ranked in the top 10 construction firms in the UK based on annual turnover. As a part of this larger UK group, Beta employs approximately 2,300 personnel across their 25 UK branches as well as generates annual revenues of approximately £800m. Following their recent merger, Beta is currently undergoing a rationalization process to get the different bolt-on companies within the same region to work together under their parent

company. The Western Regional office of Beta, responsible for projects across the Midlands Region of UK, participated in this research.

6.2.2 Case Study Project Description

Beta was on a four year framework agreement with a county council in the West-Midlands. As part of this agreement, they were awarded five projects that amounted to approximately £4.0 million, having being selected from amongst four other MCs on the framework through a negotiation process. The awarded contracts comprised the refurbishment, remodelling and upgrading of four schools and one fire station within the county. Data collection for this research was undertaken on one of the schools that constituted the five projects. The Beta project was a £1.8 million two storey new-build extension to an existing school to provide new teaching rooms in addition to remodelling of the existing school section to create a new nursery space.

The new work section accounted for nearly 70% of the project whilst refurbishments accounted for the other 30% in contract value terms. The project was programmed to run for 52 weeks and as at March 2012 when data collection commenced, about 65% of the works were complete with the programme in week 32. The contract was initially agreed as a target cost contract under the NEC 3 (option C) contract form. The initial target was to save 5% of the actual project cost which would be shared 50% each with the client organisation. However, poor detailing and co-ordination of drawings prepared by the designers gave rise to a lot of compensation events which eventually necessitated a renegotiation of the payment terms.

The target cost was subsequently scrapped in favour of a lump sum agreement shortly after the project commenced. Beta agreed to take on board co-ordination and detailing risk, whilst

readjusting the lump sum figure in the case of any significant design changes. This was to provide more cost certainty for the client as long as there were no major changes to the design. The Beta project was sub-divided into 30 different subcontract packages that were sublet to 10 key SCs although other firms undertook some minor works. A summary of the Beta project characteristics is presented in Table 6.1.

Table 6.1: Characteristics for project Beta

No.	Project features	Project Beta
1	Nature of project	School
2	Location of project	West-Midlands
3	Nature of works	80% new works and 20% refurbishment
4	Type of client	Public client
5	Mode of contractor selection	Negotiation
6	Proposed project duration	12 months
7	Current stage of project	65% complete; Month 8
8	Procurement arrangement	Framework agreement
9	Contract form	NEC 3
10	Contract sum	£ 1.8 million
11	Number of subcontract packages	30

6.2.3 Research Participants

Altogether, seven (7) face-to-face interviews were conducted for the Beta case study. This comprised three (3) key personnel from Beta and four (4) key personnel that constituted part of the ten key SCs on the project. The background of participants that were interviewed are summarised in Table 6.2. All research participants were male that had a minimum of 11 years working experience in the construction industry. The extensive experience and respective roles of participants made them appropriate for the study.

Table 6.2: Research participants for case study Beta

No.	Organisation	Position	Gender	Age (years)	Years of experience	Qualification
1	Beta	Managing Surveyor	Male	41-50	16-20	University Degree
2	Beta	Senior Site Manager	Male	Over 60	> 20	NVQ
3	Beta	Chief Quantity Surveyor	Male	51-60	> 20	University Degree
4	Roofing Subcontractor	Contracts Manager	Male	41-50	11-15	University Degree
5	Bricklaying Subcontractor	Director*	Male	51-60	> 20	City and Guilds
6	Interior Works Subcontractor	Director*	Male	51-60	16-20	High School Certificate
7	Electrical Subcontractor	Director*	Male	41-50	> 20	City and Guilds

*Directors were responsible for contract management of their work package at the site level

6.3 SUPPLY CHAIN MANAGEMENT PRACTICES OF BETA

The main features that emerged from the analysis of Beta's SCM practices are discussed under the eight themes that emerged from the analysis: 1) supply chain orientation; 2) supply base management; 3) supply chain assessments; 4) long-term relationships; 5) supply chain performance; 6) supply chain IT system; 7) continuous performance improvements and 8) supply chain motivation and reward. These are also summarised in Table 6.3.

Table 6.3: Supply chain management strategy of Beta

Features	Description of Beta's SCM strategy
Supply chain orientation	<ul style="list-style-type: none"> To promote repeat business with same contractors so as to achieve better performance Subcontract 70-80% of workload annually No specific person designated to manage the supply chain as this is now an added responsibility of the commercial team.
Supply base management (size, connectedness, classification)	<ul style="list-style-type: none"> Regionalized supply chain with approximately 150 subcontractors Small-sized supply base with a four tiered classification system where subcontractors are either categorised as platinum, gold, silver or bronze. Subcontractors not explicitly informed of their status on the supply chain. Low levels of connectedness* with their supply chain.
Supply chain assessments	<ul style="list-style-type: none"> Assessment through a standard subcontractor questionnaire Obtain the necessary references. Audit of company registration numbers, VAT numbers, CITB, type of order value they do, H&S advisors, insurance details, levels of insurance, trade federation membership relationship.
Long-term relationships	<ul style="list-style-type: none"> Approximately 40% of workload awarded to platinum [Highest ranked] subcontractors annually

Features	Description of Beta's SCM strategy
Supply chain performance	<ul style="list-style-type: none"> • <i>Monthly scoring on quality of work and H&S that are discussed with subcontractors</i> • <i>Close-out scoring on performance to specification, performance to programme, office support and general helpfulness, contractual financial attitude, environmental awareness and safety performance.</i> • <i>Weighted scores are entered onto supply chain IT system</i> • <i>Ratings are not discussed with subcontractors but they are also given the opportunity to score project team's performance.</i>
Information Technology	<ul style="list-style-type: none"> • <i>Extensive subcontractor and material supply database that is held on a central server</i> • <i>Holds performance scores and relevant subcontractor information.</i> • <i>Unable to track live con-current workloads being undertaken by a single SC.</i>
Continuous performance improvements	<ul style="list-style-type: none"> • <i>Ad hoc as against formalised or structured meetings to engage with subcontractors and discuss progress and performance improvement targets.</i> • <i>In-house H&S training and certification for subcontractors.</i>
Supply Chain Motivation & Reward	<ul style="list-style-type: none"> • <i>Monthly supply chain awards especially for health and safety performance.</i> • <i>Opportunity to discuss and continuously tender for future work on ad hoc basis.</i> • <i>35 days payment arrangement adhered to around 80% of the time.</i>

* No formalized meeting with SCs to discuss progress of supply chain relationship

6.3.1 Supply Chain Orientation

Beta subcontracted between 70-80% of work (based on contract value) to SCs that qualified to get onto or were already on their supply chain. The other 20-30% represented preliminary items and directly purchased materials. Beta implemented a SCM process to facilitate management of their SCs, which was still running independently after their recent merger. However, there was no specific person or team dedicated to their SCM functions as the supply chain manager position had been scrapped during a staff reduction exercise. The commercial department had thus been given added responsibility of coordinating Beta's SCM functions. The chief quantity surveyor who had oversight responsibility of Beta's SCM process explained that their underlying motivation for adopting SCM was to promote repeat business with the same SCs, though he acknowledged this was not always possible to achieve.

6.3.2 Supply Chain Assessments

Beta's SCM policy was to only subcontract work to SCs that had passed a supply chain assessment. They had a vetting process that was explained by their managing surveyor:

“To introduce new members, they have to go through the vetting process which isn’t a five minutes job. They have to provide an awful lot of information in order to satisfy the criteria for getting onto the database. So the introduction of new people onto the database is quite a stringent process...look at quality and health and safety and all of that sort of recommendations and financial checks”.

The chief quantity surveyor provided further details of information that was sought during this vetting process. Through the use of a standard SC questionnaire, information was sought on company registration numbers, VAT numbers, engagements with Construction Industry Training Board (CITB), minimum and maximum orders, what training they carry out, H&S advisors they provide, their insurance details, their level of competence (regarding membership status with trade federations), ethics, work experience and necessary references. Thus this vetting process encompassed the evaluation of technical competence, financial standing, professional standing and company ethics, sometimes requiring the use of third party sources such as referees and status of affiliation with trade federations. SCs could only secure work with Beta and subsequently become part of their supply chain base after successfully undergoing this assessment process.

6.3.3 Supply Base Management

Beta operated a regionalized supply chain base that comprised approximately 150 SCs that were categorized into a four levelled supply chain structure. This categorisation was based on a comprehensive scoring process that was undertaken at the end of every project. The chief quantity surveyor explained how Beta scored SCs as either platinum, gold, silver or bronze. The platinum SCs were used on a regular basis (more than twice in a year) and had to achieve a minimum performance score of 60%. The gold SCs were also used regularly but not as compared to the platinum SCs, and had to also achieve a minimum performance score of 60%. The silver and bronze SCs were described as the lesser style SCs. The silver rated SCs were used once in a while whereas the bronze SCs had passed all the assessment

criteria (supply chain assessments) but had never been used on a Beta project. SCs that were interviewed during the project were however not aware of their present status on Beta's four-tiered supply chain categorization system. One of the SCs made this remark about Beta's SCM process:

"...we are on their supply chain I'm told...It goes back over a few years, the supply chain, where they came up with the idea of having a certain amount of contractors that they'd call key supply companies which they worked with for a few years, and they'd got a proven track record, obviously delivering projects on time and within budget etc...I think it's faltered over the years, well we know it has in fairness, primarily, probably down to the economic situation" - **Director, Electrical SC**

The above view suggests that less emphasis was presently being placed on Beta's SCM process. Though SCs demonstrated awareness of Beta's original motive for implementing a SCM process, there was a general feeling that this was not as functional as it had been in the past.

6.3.4 Long-term Relationships

Beta's supply chain was set up to ensure that approximately 40% of annual workload was allocated to their platinum SCs. The Chief quantity surveyor remarked:

"...the platinum subcontractors will do about 40 per cent of our workload annually"

Beta's managing surveyor also explained that they had a core of SCs with whom they strived to maintain long-term relationships. This core was however fluid as companies fell off sometimes whilst new companies progressed onto their platinum level. The managing surveyor further intimated their efforts to maintain the aspiration of developing long-term supply chain relationships with a core of firms that could contribute to their business. These were perhaps the 40% of SCs that were mentioned by the Chief quantity surveyor.

The electrical SC was however of the view that Beta needed to properly optimize their use of highly rated SCs by adequately matching them to projects that required exceptional

performance (highly sensitive projects) if they still wanted to derive any benefits from their SCM process.

“Some jobs might need to be done on a cheaper budget and perhaps they can use a different contractor, but they need to identify it. I think they need to get their system a bit more finite, whereas if it’s a job that’s more tight on a project, but it’s gotta be exceptionally done, they could have contractors in that sort of area. If it’s a flexible job, y’know, they need to do a lot more work really. I think the whole philosophy of it has changed really, it’s not their fault, but like we said at the outset, the economics of the country, the world, everything, it’s all changed, but they need to look at it and look at it sensibly” - **Director, Electrical SC**

The above statement reflected the feeling amongst some SCs that Beta did not properly match their SCs to projects that were of a sensitive nature, increasing the potential for project failure. This view also suggested that SCs that had worked with Beta for many years were not prioritized and strategically managed, again reflecting perhaps the absence of a designated person or team that had sole responsibility for managing strategic relationships with their supply chain.

6.3.5 Supply Chain IT System

Beta had in place a supply chain IT system that was used to manage their SCs. This IT system held SC documentation obtained during the supply chain assessment process. The managing surveyor remarked:

“...we have a very extensive subcontractor and material database and so that is held centrally on the server basically and the supply chains are updated on that database....We are only allowed to procure from people that are actively up-to-date on our database”

Information on SC performance was thus logged onto the supply chain IT database. The chief quantity surveyor also indicated that the status of SCs regarding their in-house H&S training and certification was also updated on this database. The database was apparently

used by the project teams to review SC performance on previous projects, informing future selection decisions. The chief quantity surveyor further acknowledged that one of the weaknesses of their IT system was the inability to track concurrent workloads that had been allocated to any individual SC.

6.3.6 Supply Chain Performance

Beta scored each SC on a monthly basis during the project with a final ‘close-out’ score at project completion. The ‘close-out’ performance score was then logged onto the supply chain IT database at project completion. SCs were scored on performance to specification, performance to programme, office support and general helpfulness, contractual financial attitude, environmental awareness and safety performance. SCs that underperformed significantly were invited by senior management for a discussion on how to improve. Thus performance scores were not necessarily disclosed during the project except for when it became necessary for performance improvement interventions, especially on H&S and quality aspects of performance. Due to the absence of a dedicated supply chain manager, these ‘close-out’ performance scores had to be updated on the IT system by an administrative assistant at the head office.

“We feed this [close out scores] into our central database. That is something that used to be updated by our supply chain manager when she was in place. That information is now centrally uploaded by an admin assistant and the information is updated on our group database based on the closeout meeting” - Managing surveyor, Beta

It was based on these performance scores that the status of SCs on Beta’s database was upgraded.

6.3.7 Continuous Performance Improvement

Beta aggressively promoted a strict H&S culture on their project sites and had instituted an in-house H&S training and certification scheme for SCs on their supply chain database. The managing surveyor claimed that some of their highest performing SCs occasionally failed to meet increasingly stringent (progressive) H&S requirements especially because these had some cost implications. Regarding Beta's H&S certification scheme, courses and training materials were provided to a SC's director who was subsequently required to use these in training their own staff on Beta's H&S requirements. SCs that had undergone this training were awarded a certificate to indicate their ability to meet Beta's H&S requirements during their projects. The in-house H&S training and certification scheme was thus a requirement if SCs expected to keep winning work from Beta.

Apart from this H&S initiative, limited efforts were made to collaboratively engage with SCs to discuss performance issues and set future targets. A SC that had ten years of working relationship with Beta expressed this view about the current situation:

"....they don't keep in touch with us on a regular basis. I try and go in and see them every three or four months and it's difficult to get an appointment with them, because they're busy I suppose, so I think it would be good to meet up with them maybe twice a year with them, so they could let us know what's going on" -**Director, Interior works SC**

The managing surveyor had earlier given reasons for the rather sporadic nature of engagements with their SCs. A formalized and well-coordinated annual supply chain review meeting with strategic SCs was described as an activity that required a dedicated supply chain manager. This had become difficult to achieve because Beta was now reliant on their already busy commercial teams to discuss upcoming pipeline of work and set improvements areas – making it an ad hoc exercise that was only undertaken when it became very

necessary. The chief quantity surveyor unsurprisingly made this admission about the manner in which their SCs were currently managed:

“...The biggest improvement we can make is to have a closer involvement in communication with our supply chain, that’s where we’re lacking at the moment without a shadow of a doubt. I think if we could get closer to our supply chain, it would help us with our tendering and our pricing and that’s one area which we need to look at because, at the end of the day, we rely on the supply chain to do the work, they do it for us”

The chief quantity surveyor linked their recent tendering failures to this lack of closer engagement with SCs who could provide honest prices in support of their tenders. This reveals that a significant area of weakness in Beta’s SCM process that needed improvement was closer engagement with SCs that could enhance their tendering and pricing activities as well as contribute towards achievement of other strategic business objectives.

6.3.8 Supply Chain Motivation and Reward

Beta motivated and rewarded their SCs through fair payment arrangements, opportunity to price for upcoming works and monthly supply chain awards. Beta had a 35 days payment arrangement with their SCs. This was explained by the chief quantity surveyor:

“Well, they’re signed up to 35 days and, 80 per cent of the time, I would say we adhere to that. There are occasions when it slips, but it’s not deliberate, it’s just timing issues”

The above statement reveals that although this arrangement was mostly achieved 80% of the time, there was a 20% failure that was claimed to be unintentional. It was further claimed that the supply chain were motivated through opportunities to price tenders especially when there was no present engagement with Beta. This opportunity was explained by the managing surveyor:

“...you do sort of generate relationships with these guys and so if they are a bit low on work, they give us a call to try and see what’s coming up or you know next time we are talking to them or we’re discussing one of the accounts, we’ve got this coming up in the future”

Thus such meetings and discussions on work opportunities were considered by the project team to be a source of motivation to their SCs although it occurred in a rather unstructured and informal manner. Beta also administered a SC of the month award to their best performing SCs. The senior management team had to recommend SCs that had achieved exceptional performance on a monthly basis and a winner was chosen for the monthly supply chain award. The aim of this award was to motivate SCs to perform better. However, the managing surveyor acknowledged that SCs were rather interested in securing future work and getting fair payment for work done as the award scheme did not get enough profile.

In summary, Beta’s SCM practices were poorly coordinated as this had become an additional responsibility of their already busy commercial team. The highlight of their SCM practice was the in-house H&S training and certification initiative that gave participating SCs a feeling of belonging to Beta’s supply chain. Nonetheless, SCs were of the view that Beta’s SCM process had recently faltered significantly, resulting in failure to prioritize high performing SCs for high profile projects.

6.4 MANIFESTATION OF TRUST

To understand how trust manifested in Beta’s supply chain during the project, views were sought from the different parties about what they considered important with regards to trust (trust attributes), the nature of trust that prevailed amongst the different project delivery team members and how this influenced SC selection decisions.

6.4.1 Trust Attributes

There were similarities in trust attributes that Beta's personnel and SCs considered important. Both parties expressed familiarity, competence, and reliance for help (see extracts in Table 6.4) as important trust attributes. Beta's emphasis on the trust attributes they considered important was reflected in this statement by the senior site manager:

"...if the company deploy the right subcontract orders and I get the right subcontractors, namely that is the combination of people we know, people we love to work with. If I have got the right subcontractors on the job, that I can trust and I make sure that the materials are here, for each of those elements, I could sit on this desk and forget it"

The above statement indicates the extent to which trust was conceived as *familiarity and competence* from Beta's perspective. Regarding *reliance for help*, the project team expected SCs they trusted to help them out of problems during the project whereas conversely, SCs expressed the same attribute in relation to support for their business growth through repeat business opportunities. SCs also considered *familiarity and competence* as important trust attributes as these gave them an indication of the project team's ability to run an efficient job.

SCs however exclusively emphasised *fair and reasonable treatment, honesty and integrity, openness and reputation* as additional trust attributes that they considered important. These attributes were however expressed in relation to payments as explained by one of the SCs:

"We like to work with people we know, that we've got a history with, and then if it was a new company and it was a large project, then you'd obviously be concerned about payments if you didn't know who they was, so it's definitely a financial issue more than anything else" - **Director, Electrical SC**

The above statement reflects SC views about attributes that related to the reaching of fair and honest payment agreements and prompt payments. Another SC explained that *fair and*

reasonable treatment was also concerned with being awarded for a good percentage of work priced as there was the tendency for them to be used for tendering purposes without any rewards. The *reputation* attribute was considered important because it was less likely for highly reputable and well established MCs to go bankrupt. The *openness* attribute was expressed in connection with the promotion of a ‘no blame’ environment where problems could easily be discussed and resolved without any finger pointing.

Table 6.4: Trust attributes from Beta and subcontractor’s perspectives

Trust attributes	Beta’s perspectives	Subcontractor perspectives
Familiarity	<i>“those that you know you already have a relationship with” “people that we have been using quite regularly”</i>	<i>“knowing how the company work once you’ve dealt with them one or two times”</i>
Competence	<i>“those who’ll turn out a high quality of work”</i>	<i>“a company that runs an efficient job”</i>
Reliance for help	<i>“people that are more likely to help you out of a problem”</i>	<i>“it’s all about repeat business so a company that looks out for us as a business so we can keep getting enquiries and jobs”</i>
Openness		<i>“company that creates an environment where if there’s a hiccup, it’s easy to pick up the phone, call or drop in, discuss it and come to a resolution”</i>
Reputation		<i>“a company that is well known in case they go bankrupt because if they go bankrupt I’m going to loose a lot of money”</i>
Fair and reasonable treatment		<i>“I think if they treat me fairly, and I get a good percentage of work I price” “being dealt with fairly and being paid on time”</i>
Honesty and integrity		<i>“contractors that will not try and get you to do extra works without intending to pay you for it” “good payers, prompt payers”</i>

6.4.2 Nature of Trust

The nature of trust that prevailed in Beta’s supply chain has also been abstracted into: 1) cognition-based trust; 2) system-based trust and 3) relational-based trust.

6.4.2.1 Cognition-based Trust

Beta's project team constantly evaluated SCs to develop some confidence that they were capable of performing successfully during the project. Information was sought from SCs through supply chain interviews, pre-order interviews and pre-start meetings. This information was used by the project team to evaluate the extent to which SCs had clearly understood the risks inherent in their work packages and their ability to manage such risks effectively. Thereafter, the senior site manager had to apply his experiential knowledge during interactions with project gangs to evaluate if they were competent enough. This reflective sense-making process was explained in the statement below:

“when a subcontractor arrives on site, and all the team that arrive to do a specific job, if I get to see a brick laying gang arrive in a vehicle out there now at this moment in time, they going to have to come to this site office, before they get on the top of those steps I can tell you whether they are going to be good or bad. It's a second sense that you build up out of just the way they turn up, with their attitude, their dress, the first few questions they ask you, you know when you're in for a problem”

- Senior site manager, Beta

This statement reveals how cognition-based trust emerged from the senior site manager's experiential knowledge or 'second sense' when he interacted with new SC working gangs. This gave him an indication of the extent to which they could be trusted during the project based on his perceptions of their trustworthiness. Cognition-based trust here was thus concerned with trustworthiness evaluation of SCs so as to arrive at reasonable confidence that they could deliver successfully.

6.4.2.2 System-based Trust

Due to Beta's strong emphasis on H&S performance of their supply chain and the consequent CPI initiative that was offered to SCs as part of their SCM strategy (see section 6.3.7), the project team spent less time on H&S inductions when a SC had undergone the

H&S certification process. This is because of the expectation that certified SCs had replicated such training with their own workforce. The project team thus trusted that certified SCs had empowered their site teams to work in accordance with Beta's H&S requirements (system-based trust). One SC who had earned this certification at the early stages of the scheme's inception shared this view:

“They are very proactive as far as safety goes, and if you're to be on their supply chain, health and safety is a must...Once you get your [in-house H&S certification], you don't have to do a half hour to three quarter of an hour induction, you just do a quarter of an hour one which saves time then. It saves time for us which we can get to work quicker and earn more money hopefully and then it frees up their site manager as well.” - **Director, Bricklaying SC**

The above statement reflects the joint ethos on H&S procedures that emerged from positive expectations that when a SC's director had been embedded in Beta's H&S practices; they would in-turn replicate this to their own workforce. Thus, less time was spent on H&S inductions with such SC's workforce, manifesting the confidence (system-based trust) that the project team had developed based on their in-house H&S training and certification scheme.

6.4.2.3 Relational-based Trust

Relational-based trust manifested during the project when there had been prior working relationship between the project team and the SCs. This dimension of trust thrived on interpersonal bonds that had been cultivated over a considerable period of time.

“...you do build up long term relationships, I've bumped into people that must have gone back 20 years, I go back 40 years and you get to know your strength and weaknesses” - **Senior site manager, Beta**

The senior site manager here reflects on how the knowledge of the SC's strength and weakness could sometimes emerge from repeated interactions and success that had been

jointly achieved in the past. The senior site manager pointed to the confidence he had in the electrical SC because of the relationally acquired knowledge and interpersonal working relationship they had cultivated over several years. This SC, when interviewed also made a similar remark concerning the senior site manager:

“...we’ve worked with [senior site manager] on several key jobs so, again, it’s this supply chain, it’s all the same thing. We know how he works, we can bend and move with [site manager]” - **Director, Electrical SC**

The electrical SC was very emphatic about the confidence he had in the senior site manager’s ability to run a successful project. They had developed a kind of working synergy that derived from their repeated interactions. This was a SC that had worked with Beta for several years until they recently went dormant without winning any work with Beta for a twelve months period. However, the previous emphasis of Beta’s supply chain strategy on long-term supply chain relationships (before it recently faltered) enabled such interpersonal bonds and consequently relational-based trust to develop at the project level.

6.4.3 Subcontractor Selection

Beta’s SC selection process involved an initial shortlisting by the project manager in consultation with the commercial team. Tender enquiries were then sent out to shortlisted SCs before they were invited for a pre-order interview. This was to ascertain the extent to which SCs understood work package requirements and how this was reflected in their pricing. A final selection subsequently followed on from the pre-order interviews, which according to the chief quantity surveyor, was based on a trade-off between price, work package and SC risks:

“..We almost certainly talk to the subcontractor and say ‘you are lower than we would expect, are you happy with what you’ve got in there?’ Then we’d look at saying ‘ok, do we want to take a risk or don’t we?’ and it would depend on the level of risk we’re buying into effectively. Then it’s a case of managing that risk to ensure

that if the worst happens and he can't complete it, how do we then get over that? If we'd feel we can't manage that sufficiently, then we wouldn't use him. It comes from trade-off and trying to understand where the potential risks lie and what the outcome of that could be"

This statement gives indication of how the project team sometimes took risks with unknown SCs although they had some doubts (low confidence) about their ability to meet performance expectations. Final selection decisions were thus oriented towards the lowest price as long as the risk being taken was properly understood and risk mitigation measures were put in place to curtail any adverse impacts of SC failure. This risk-taking practice reflected a situation where the project team had to proceed with selections although cognition-based trust was sometimes non-existent.

SCs also acknowledged that despite their competence, they had to be cheaper than other competitors before they were awarded a job on Beta's project. This was clearly encapsulated in a statement by one of the SCs that had to negotiate their way through to meet the project team's price demands irrespective of their previous relational experience and exceptional performance standards:

"They know we're reliable and they know we'll do a good job for them, but they won't pay a premium for that, so we still have to be competitive and we weren't competitive enough on our original quotation for that job, so we did have to reduce the figures to get there" - **Director, Interior works SC**

Table 6.5 summarises SC responses on the criteria for which they felt they had been awarded their subcontract packages. These responses are presented in the order in which reasons were provided by the SCs. It was clear that commercial competitiveness was the key deciding factor during Beta's selection process. The electrical SC interestingly indicated the lobby by some Beta personnel for them to be given work after a twelve month absence period which had broken down their supply chain relationship. This was because Beta had

consistently experienced problems with the M&E work package due to poor workmanship standards provided by other SCs.

Table 6.5: Subcontractor views on selection criteria for project Beta

Roofing	Bricklaying	Interior Works	Electrical
<i>High standard of workmanship and the extra value we give them.</i>	<i>Our competence and our safety because we've signed up to their H&S initiative</i>	<i>Commercial competitiveness and we had to reduce our figure</i>	<i>Commercially competitive with some price negotiations</i>
<i>Had to be commercially there or thereabout</i>	<i>Commercial competitiveness and had to negotiate final price</i>	<i>Our reliability and high level of performance</i>	<i>Lobby by some Beta personnel to buy into the high level performance we deliver</i>

These findings reveal the limited influence of trust (cognition, system and relational-based) during SC selection as the project team were primarily concerned with meeting the allocated work package budgets. They rather choose to take risks whilst making alternative provisions, should a SC fail to meet performance expectations.

In summary, weaknesses in Beta's SCM process inhibited trust development across cognition, system and relational-based dimensions as well as the extent to which trust expectations that were considered important to both Beta's personnel and SCs could be realised during the project. The lack of a well-structured SCM process contributed to the high tendency of selecting SCs that had a high potential to fail during the project.

6.5 FACTORS THAT INFLUENCED TRUST DEVELOPMENT

The factors that influenced inter-organisational trust development during the Beta project were: 1) change management; 2) economic climate; 3) project specific context; 4) payment issues; 5) job performance and 6) perceived opportunity for future work. These factors have been summarised in Table 6.6.

Table 6.6: Factors that influenced trust in Beta's supply chain

Factors	Beta	Subcontractors
Change management	<ul style="list-style-type: none"> • <i>Poor detailing and drawing coordination resulted in changes to work scope</i> • <i>Changes had to be carefully managed to avoid escalations that could degrade trust</i> 	<ul style="list-style-type: none"> • <i>Project team sometimes felt claims for extra work went overboard</i>
Economic climate	<ul style="list-style-type: none"> • <i>High tendency for firms to go into administration</i> • <i>Tight margins for which cheaper subcontractors had to be used</i> • <i>Occasional failure of subcontractors during the project necessitating recall of regular subcontractors at an extra cost</i> 	<ul style="list-style-type: none"> • <i>High tendency for project team to select unknown SCs in current market</i> • <i>Frequent recall of regular SCs due to unknown SC failure during the project.</i>
Payment issues	<ul style="list-style-type: none"> • <i>35 days payment arrangement with occasional delays</i> 	<ul style="list-style-type: none"> • <i>Delayed payments which contribute to trust breakdown</i> • <i>Follow ups with payment department three days earlier to ensure prompt payment</i> • <i>Delays in retention release which sometimes had to be traded-off during future negotiations.</i>
Project specific context	<ul style="list-style-type: none"> • <i>Negotiated project that made it commercially flexible to bring back some top category SCs</i> 	<ul style="list-style-type: none"> • <i>A better project which enabled some regular SCs to be brought back on board</i>
Job performance	<ul style="list-style-type: none"> • <i>Failure of regular and well trusted SCs during a project due to changes in their business</i> • <i>Failure to track work-overload which could potentially cause poor performance and hence trust breakdown.</i> 	<ul style="list-style-type: none"> • <i>Performance on every single job so as to maintain trust.</i> • <i>Maintenance of frequent unsolicited updates with project team to demonstrate job performance capabilities.</i>
Perceived opportunity for future work	<ul style="list-style-type: none"> • <i>High perceptions of future work opportunities contributed to trust development</i> • <i>Inability to properly manage future job expectations of some flagship SC which resulted in trust breakdowns.</i> 	<ul style="list-style-type: none"> • <i>Lack of work winning for considerable period communicates a feeling of untruthful estimates</i> • <i>Considerable period of pricing work without winning results in trust breakdown.</i> • <i>High perceptions of future work opportunity fosters behaviours that are trust enabling.</i>

6.5.1 Change Management

Poorly co-ordinated design drawings prepared by the architects as well as the refurbishment aspects of the works gave rise to legitimate changes to work scope. There was the tendency for such change related issues to cause disputes given that hardly any extra amount within the budget was allocated towards potential changes. This occasionally resulted in some

change related disagreements. The managing surveyor explained the importance of carefully managing the change process:

“...building is a really organic process so things change and it’s largely all to do with change management....if everything went absolutely to plan, you would never have a dispute because we’ve agreed what it is. But there is not a building site that goes ahead and pretty much not a subcontract package that gets let that doesn’t alter in some way, shape or form and it’s how you then go about managing change that dictates how you end up”

The project team expressed the feeling that some SCs tried to make claims for more money than they deserved. One of the SCs however discounted this as an attempt to be opportunistic with variations:

*“...we wouldn’t try and cheat anybody out of anything, but yeah, there are times when we ask for a bit more maybe than they think they should pay, for extra works for instance - **Director, Interior works SC***

The SC’s explanation here reveals that such problems were more an issue about disagreements regarding the value of extra work rather than an intentional act of opportunism. It however depicts the extent to which claims for extra works could amount to perceptions of cheating and hence distrust. The project team thus indicated the carefulness with which they strived to manage change related negotiations so as to avoid any relationship breakdown.

6.5.2 Economic Climate

Beta’s project team indicated that their major concern throughout the project was the high tendency of SCs to go into administration. The groundwork SC went into administration a few weeks after completing their work package on the project. The senior site manager expressed their fortune that this bankruptcy did not occur during the Beta project. The economic decline was thus acknowledged to have created a tendency for SCs to go into

administration. The managing surveyor further cited instances of SCs going bankrupt on some of their projects and the significant cost that was involved in getting other SCs to complete the works.

According to the SCs, the economic decline had also increased the tendency of Beta's project team to take risks with unproven SCs that offered cheaper prices which sometimes proved to be unsuccessful. The chief quantity surveyor acknowledged that of recent, some unproven SCs had let them down by failing to meet the required quality performance standards. Two of the regular SCs on the Beta project explained how Beta had often engaged them in completing works that could not be finished by other SCs. One of the SCs made this remark about the situation:

“....they'd [Beta] take the risk...they've done it recently on other jobs and things have gone wrong and we've had to go in and put things right that other contractors have done for them. I don't want to do that, but we're happy to do it for the sake of the relationship we've got from them, we'll do it and help them out” - **Director, Interior works SC**

The above statement confirmed the high rate at which new SCs brought onto Beta's projects were unable to meet performance requirements. This perhaps was the result of not having a dedicated team that could undertake robust supply chain assessments before SCs were awarded work (see section 6.3). There was however no such failure during the Beta project because the project team had made a deliberate attempt to get as many of their regular supply chain SCs onto this project as possible to curtail such increasingly high failure rates.

6.5.3 Payment Issues

Although Beta had a 35 days payment arrangement with SCs (see section 6.8.3), some SCs expressed dissatisfaction about the promptness of payments. This had a negative influence

on SC's perceptions about Beta's trustworthiness. One of the SCs expressed this negative sentiment:

"...if you're one of the supply chain and that's where it is, they should be making sure that you are paid exactly when it's time, not any delay, no excuse, it should be there. If you're in there to look after their interests at the front to deliver all the dates, you expect them to be there at the back to deliver all the payments...they hold payments up for whatever reason, that's when it all starts to break down, because where we've helped out on site and we've managed to pull the job together and then all of a sudden the payments are late" - **Director, Electrical SC**

The above statement reveals perceptions by some of the SCs that Beta deliberately holds on to payments although the chief quantity surveyor had earlier intimated that the 20% failure in meeting payment obligations was unintentional. Another SC explained how they had devised a strategy to ensure prompt receipt of payments from Beta. This SC narrated how experiences of late payment on previous projects had prompted them to initiate tracking of their money three days prior to the agreed date by phoning Beta's accounts department. This strategy had since been maintained on the current project to ensure prompt receipt of payment.

Another payment-related problem expressed by SCs was delays in retention repayments. This statement below depicts the views that were provided during the interviews:

"...retentions are a bone of contention, we have to chase those very hard...It's a difficult one. What tends to happen, in theory, half of the retention is released on practical completion and then the other half should be released after either six or twelve months, but often it goes into years and it could be three, four, five years to wait, that's the problem" - **Director, Interior works SC**

Such delays in retention release contributed to negative perceptions regarding the real motive for retention deductions in the first place. SCs therefore expressed reservations about Beta's commitment to timely release of deducted retentions sums (negative expectations).

Another SC made explained that they usually made reference to their owed retention sums when trying to reach an acceptable figure during negotiations on final accounts or new jobs.

6.5.4 Project Specific Context

Given that project Beta was negotiated with the client as part of a framework contract, the project team claimed that this provided some budget flexibility that enabled them bring back some of their regular SCs. The regular SCs that had been brought back on board also made similar claims:

“...the job is one of their better jobs and also several other companies I believe have come back on board. It speaks for itself....When it was running the old way, the key personnel, all surveyors...everybody knew each other, so the trust was always there”

- Director, Electrical SC

In this SC's remark, the current relational atmosphere on the Beta project was being compared to periods before the economic decline when the SCM strategy and the promotion of long-term supply chain relationships were prioritized by Beta. Because of the negotiated nature of the present project, SCs once again had the opportunity to work together; contributing to a gradual re-emergence of relational-based trust.

6.5.4 Job Performance

The project team claimed that on some of their other projects, SCs that were known to be high performers had begun to perform below expectations due to changes in their business. Some had lost their best site supervisors as a result of the economic decline. The managing surveyor explained:

“...unfortunately some of those people that have been on the database for years that you do use have to change their business and they may have been an eight out of ten subcontractor before, has had to take some views on his business and how he runs it and who he employs, that drops his level of performance to six out of ten. And so

the trouble with that is you don't know that they've changed how they go about doing their business until you're on site with them and the problem crops up"

The managing surveyor therefore reiterated concern about progressive job performance especially on the present project as performance failures were likely to completely erode any past performance achievements. The project team decided to employ strict supervision when there were doubts about SCs' ability to deliver. However, Beta's inability to detect early changes in SCs business could have been due to the less robust nature of their supply chain assessment process and the limited engagements with their SCs. The possibility of performance failures as a result of work overload was also acknowledged by the chief quantity surveyor who attributed this to a flaw in their supply chain IT system – which could not detect concurrent award of work packages to any single SC at a given time.

Similarly, SCs were of the view that progressive job performance on every project was the best strategy for them to assert their competence (trustworthiness). One SC explained:

"...effectively you're only as good as your last job as far as I see it so we look to perform on every single job and on that basis, their company have then got surety that our company does what it says and they keep coming back to us" - **Contracts manager, Roofing SC**

This SC further explained how they had developed a strategy of sending unsolicited weekly work plans to the project team to demonstrate and create awareness of the control they had in the delivery of their work package. This was a communication strategy that had been adopted to provide the project team with confidence that they were capable of meeting job performance requirements, thereby asserting their competence (trustworthiness).

6.5.4 Perceived Opportunity for Future Work

SC expectations regarding future work opportunities influenced their trust perceptions during the project. Those that had higher expectations of securing future work expressed

higher levels of trustfulness towards Beta. The electrical SC for example linked their continued failure to secure work from Beta to a kind of negative mind-set by Beta's project team about the honesty of their estimates. The SC made this remark to explain how this had influenced their own expectation of future work and hence their trustfulness towards Beta:

"...I think the trust is alleviated down to cost as well. So if they'd been looking at our costs and they've gone out to another contractor and that contractor's been substantially cheaper, have they been looking at us thinking we've been ripping them off for years? Then we've gone out the frame, they've used some other contractors, these contractors have worked on and off for a few months, not delivered the project, extras, so all of a sudden they realised perhaps we ain't been ripping them off, but that trust's been broken"

In the above statement, the electrical SC emphatically claims that although Beta had now come to realise that their estimates were perhaps accurate, and had made efforts to bring them back onto their projects, trust was already broken. This electrical SC continued to explain how this incident had consequently resulted in a lack of trustfulness towards Beta given the fear that their services could again be boycotted if recent experiences were anything to learn from. This situation could thus only be repaired if confidence in Beta's desire to preserve strategic supply chain relationships is regained over time through consistent job continuity. Whilst this situation reflected Beta's inability to properly manage expectations of their flagship SCs through high level communication when it was not possible to offer continuous work opportunities, it revealed how expectations of future work influenced SC trustfulness.

In summary, these discussions reveal how weaknesses in Beta's SCM practices contributed negatively to trust development during the project, particularly with regards to payment issues, job performance and perceived opportunities for future work.

6.6 FUNCTIONAL CONSEQUENCES OF TRUST

The behavioural consequences of trust during the Beta project are discussed as: 1) effective knowledge sharing; 2) self-organising behaviour; 3) relational flexibility; and 4) extra commitment. These behavioural consequences, which are summarised in Table 6.7 also had implications for satisfactory achievement of H&S performance, programme compliance, cost performance, and quality of workmanship.

Table 6.7: Functional consequences of trust in Beta's supply chain

Behavioural consequences	Beta	Subcontractors
Effective knowledge sharing	<ul style="list-style-type: none"> • <i>Willingness to make value engineering inputs during the project even when trust was cognitive in nature.</i> • <i>Contributed to improvements in quality and cost performance of the project.</i> 	<ul style="list-style-type: none"> • <i>Willingness to make value engineering inputs that demonstrate competencies irrespective of nature of trusts</i>
Self-organising behaviour	<ul style="list-style-type: none"> • <i>Poorly coordinated SCM practices inhibit development of cognition-based trust.</i> • <i>Inability of SCs self-manage work as this did not dominate cognitive-based assessments.</i> • <i>Highly reliant on supervision to ensure performance of most SCs.</i> • <i>Established learning curve with system and relational-based trust</i> • <i>System and relational-based trust promoted self-management opportunities.</i> 	<ul style="list-style-type: none"> • <i>System and relational-based trust promoted opportunities for self-management capabilities to be displayed.</i>
Relational flexibility	<ul style="list-style-type: none"> • <i>Less formality and infrequent M&E meetings due to relational-based trust at the interpersonal level.</i> 	<ul style="list-style-type: none"> • <i>Switch from informality to formal and contractual relationship due to breakdown in relational-based trust which has cost implications.</i> • <i>Maintenance of informality due to relational-based trust from site level interpersonal relationship.</i> • <i>More formal and contractual relationship when there is no familiarity.</i>
Extra commitment	<ul style="list-style-type: none"> • <i>Maintain a core of these highly trusted supply chain firms as they are backbone of the business.</i> 	<ul style="list-style-type: none"> • <i>Keen to help out on site to finish work that other SCs could not do due to relational-based trust.</i> • <i>Working extra (weekends) just to pull programme back on track.</i>

6.5.1 Effective Knowledge Sharing

Though Beta had recorded performance failures using unfamiliar SCs, the chief quantity surveyor claimed that SCs were generally willing to make as much value engineering contributions to their projects as they could. The chief quantity surveyor remarked:

“...[willingness to share knowledge] can work well with new subcontractors as well because they’re keen to impress, so they’ll provide you a very good service in the first instance because they’re looking to get in and get future work from you”

The above statement reveals the perception that effective sharing of knowledge towards achievement of project objectives was independent of the nature of trust that existed in the relationship. This was because SCs were always keen to demonstrate their competence, although they sometimes failed due to the lack of competence. The interviewed SCs also acknowledged this view, indicating their keenness to make any value-adding suggestions that yielded cost savings or improved the quality of the project. All the SCs – irrespective of trust being cognition, system or relationally derived – were thus keen to share their knowledge through value engineering suggestions.

6.5.2 Self-organising Behaviour

The success of this project was heavily reliant on Beta’s supervision except for instances when SCs had previously demonstrated their ability to self-manage their work package. This was because the project team did not have enough confidence in the ability of unfamiliar SCs to manage their work package, having not made the efforts to audit SC competence robustly. The managing surveyor explained the problems they had encountered concerning SC’s inability to self-manage their work package:

“...sometimes, you end up with a subcontractor that you rely on and you get caught. And you know, we’ve got jobs on at the moment where we have by virtue of the fact that we’ve relied on the subcontractor to do what he is supposed to do, we’ve had to rely on them to do it right first time, and they haven’t, we’ve got problems”

These failures were however linked to weaknesses in Beta's supply chain assessment process and their high risk approach to SC selection (section 6.4.3). SCs were sometimes selected for their lowest price tenders without gaining enough confidence during supply chain assessments (cognition-based trust). However self-organising behaviours were demonstrated during instances when system and relational-based trust prevailed. According to the chief quantity surveyor, this made SC management during the project more cost effective:

"...it is far easier for the guys on site, and also for [Beta] generally and more cost effective for people who know how we work from a health and safety perspective, whereby we haven't got to continually chase them and get on their case to do things that should be second nature to them"

The reduced management cost in the presence of system and relational-based trust was as a result of an already established learning curve. This self-organising potential only became evident in the case of the few SCs that had developed system and relational-based trust with the project team. The director of the bricklaying firm remarked:

"...they gave us a programme, and they said, you've got to meet this programme whatever happens, you've got to do it. And because of my supervisor here, we got a very competent supervisor who is here, the site manager knows him from before"

The statement reveals the relational-based nature of trust that prevailed between the bricklaying SC's supervisor and the senior site manager, which promoted that atmosphere where the SC could self-manage their work successfully without any failure. Though cognition-based trust could have also translated into the realisation of self-organising behaviours as revealed from the previous case study, such cognition-based trust was sometimes non-existent during the Beta project due to weaknesses in the supply chain assessment process. Also, the cognition-based aspects of trust that prevailed during the project did not emerge from knowledge gained during the supply chain assessment process

but rather from first-time project level interactions at a point when potentially high risk SCs had already been selected.

6.5.3 Relational Flexibility

Beta's project team became more formal and contractual with SCs when there had not been any previous relational experience between the SC and the project team. An incident occurred at the early stages of the project when a project manager that was initially allocated to the project became very contractual with the electrical SC. The electrical SC explained how the pre-start interview began on a tepid premise, citing the numerous contractual emails that 'flew around' on issues that were claimed to be basic had the project manager known their track record through a previous relationship. This project manager was however later replaced with the senior site manager, who had worked with the electrical SC on countless occasions. The electrical SC explained the sudden transition to an informal and relationally flexible project relationship that emerged from previous relational experience:

"...now with [MC2-site manager] who has replaced [MC1-project manager], who we've known for years, I haven't got an email off [MC2] for six months, 'cos I don't require it. You can pick the phone up and say something and we've both got that trust"

This statement reveals that relational flexibility is an interpersonal phenomenon that could become non-existent when dealing with unfamiliar personnel within a familiar organisation. The senior site manager similarly confirmed the influence of relational-based trust on the flexible relationship with the electrical SC:

"...if it hadn't have been for that sort of trust, you'd probably end up having a lot more site meetings, what's called M&E meetings, used on this type of project. There are one probably every two or three weeks, we don't have them"

Yet, aside this interpersonal project level relationship with the senior site manager where the electrical SC demonstrated such relational flexibility, a rather contractual and formal

approach emerged at the inter-organisational level. The electrical SC narrated how breakdown in relational-based trust at the inter-organisational level contributed to their contractual and formal posture towards Beta:

“...we’d been with them for 15 years or more, so the track record was consistently there....but obviously we’ve come back in now, the trouble being we’ve come back in with a different attitude now, we’re a bit tighter than we used to be with [Beta], so it’s gone against them really...whereas before, if something small needed to be done and we’d just say ‘oh, we’ll do that.’ Now, it’s like ... ‘it’s a cost.’ So they’ve broken the supply chain friendship in a way, as they have with a lot of other companies” - **Director, Electrical SC**

Due to the feeling of betrayal from lack of work for a twelve months period, this SC had adopted a contractual approach, with the view that Beta could repeat this again in the future (see section 6.5.4). This illustrates how breakdown in relational-based trust switched a previously informal relationship to one that was very formal and contractual at the inter-organisational level, yet how such informality still prevailed at the interpersonal level based on historical relationships and interpersonal bonds. The cost implication of over formalization was further highlighted in the above statement. These revelations also reinforce the interpersonal rather than inter-organisational nature of relational-based trust.

6.5.4 Extra commitment

Extra commitment was displayed by regular supply chain SCs that engaged more frequently with Beta and had developed higher expectations that emerged from relational-based trust with the project team. The managing surveyor claimed that such SCs were prepared to go an extra mile to help them out of any problem. The bricklaying SC narrated how they had tried to help Beta get the programme back on track by working Saturdays and Sundays at no extra charge because of the length of relationship and trust they had built-up with Beta. This was however in the hope that they could continue to secure future work. Another SC

explained how committed they had been in supporting Beta's work winning functions by providing competitive tender rates:

"We will go in on a tighter margin for [Beta] because we know they're quite good. People like [senior site manager] are good, they run a good job. We will get paid, it might take a while sometimes, but that trust factor does make a difference. If there was the same job for another company that either we didn't know or weren't as good, we wouldn't be prepared to go in as low, definitely not" - **Director, Interior works SC**

These above SCs (bricklaying and interior works SCs) were also the ones that came in to help Beta complete works that other SCs had failed to complete successfully on previous projects. Beta's managing surveyor thus emphasised the need to maintain a core of such highly committed and dedicated SC that were the backbone of their business although this had become a challenge during the period of economic decline. The opportunity for repeat business and the financial benefits that SCs could derive from Beta seemed to be most crucial to their display of trustfulness and ultimately the cultivation of inter-organisational trust. SCs that perceived a higher opportunity to secure future work were relatively more trustful and committed than those that had experienced several disappointments or were working with Beta for the first time.

6.7 SUMMARY

Beta's SCM practices have been discussed in this chapter as comprising a supply chain orientation, supply chain assessment, supply base management, performance scoring, CPI activities, long-term relationships and supply chain motivation & rewards. It has been revealed however that there are weaknesses in Beta's SCM process which have come about as a consequence of a decline in the economy. These weaknesses inhibited inter-organisational trust development during the project. The lack of a designated team solely responsible for strategically managing relationships with SCs, lack of robust supply chain

assessments, untimely payments and lack of continuous work opportunities had contributed to the growing discontent amongst some of their SCs.

Trust had also become mainly an interpersonal phenomenon that emerged from first-time interactions (cognition-based trust) or from prior familiarity amongst project delivery personnel (relational-based trust). Except for aspects of system-based trust that emerged from Beta's in-house training and certification initiative, institutional based sources of cognition and system-based trust had been weakened. In particular, an absence of cognition-based trust resulted in a high rate of SC failure although not particularly on the Beta project.

The factors that influenced trust development during the Beta project have also been discussed. Payment issues and perceived opportunity for future work have emerged as trust-influencing factors that were linked to weaknesses in Beta's strategic SCM process. The functional consequences of trust were therefore limited as only few SCs demonstrated self-organising behaviours, relational flexibility and extra commitment. Though Beta's personnel acknowledged the need to maintain a core of firms that could support their business functions, there is still the need for further refinement of their SCM practices if this can be used as a strategy to foster inter-organisational trust development in their supply chain. The next chapter (Chapter Seven) discusses findings from the Gamma case study.

CHAPTER SEVEN: CASE STUDY GAMMA

7.1 INTRODUCTION

This chapter presents findings from the Gamma case study. The background is first outlined before discussing findings on Gamma's SCM practices, trust manifestation, trust influencing factors and the functional consequences of trust during the Gamma project. These findings are presented in accordance with the research aim, which sought to investigate SCM practices adopted by selected UK MCs and its consequent influence on inter-organisational trust development. It thus contributes to meeting objective four of the research.

7.2 CASE STUDY BACKGROUND

The Gamma case study background which entails brief background information about Gamma, description of the Gamma project and information about the research participants is required to ensure that findings from the Gamma case study are interpreted within context.

7.2.1 Background of Company

Gamma is a major player in the UK construction industry that has consistently been ranked in the top 10 of UK contractors (based on annual turnover). Gamma was originally founded in 1978 before expanding into a multinational organisation that currently operates five regional offices across the UK in addition to several global offices. Their annual turnover is approximately £3.5b and they employ around 15,000 personnel globally. Gamma recently set up a £30 million off-site manufacturing centre as well as took over a large mechanical and electrical (M&E) company in the UK. Their aim is to gradually transform their identity from a construction organisation to an engineering enterprise through off-site manufacture. The Northern regional sector office of Gamma participated in this research.

7.2.2 Case Study Project Description

Project Gamma was a £21 million school construction that constituted one of three ‘building schools for the future’ (BSF) packages (totalling £75 million). The project was located in the North-West region of England. Gamma had been selected through a competitive tendering process to form part of a special purpose vehicle (SPV) known as the local education partnership (LEP), which also comprised a facilities management (FM) company, the city council and a financial organisation. The project was delivered under a private finance initiative (PFI) scheme. The project was administered using a bespoke PFI form of contract that had been developed and set up by the client (LEP).

The project comprised two phases. The first phase involved construction of a new build two storey high school building (area of 7,311 m²) whilst the second phase entailed demolition of old school building. The new build school comprised the following components: continuous flight auger piles and pre-cast concrete beams foundations, suspended ground floor slabs, precast concrete frames, precast concrete composite panel envelop, asphalt top-deck roofing and plasterboard fit-out partitions. The project duration was 25 months although the last eight (8) months were allocated to demolition of the old school. Thus actual duration for the new build section was 15 months. Data collection commenced in July 2012 when the project was at an advanced stage - 65% of works complete and 10 months into the programme.

The project was sub-divided into 46 work packages that were sublet to 33 SCs and supplier firms, which also included Gamma’s in-house companies undertaking M&E, foundation and precast envelop packages. Most of the suppliers and SCs selected for the project were involved in manufacturing and installation, consistent with Gamma’s ambition to promote

a design for manufacture and assembly (DFMA) strategy through predominant use of precast elements. A summary of the project characteristics is presented in Table 7.1.

Table 7.1: Project characteristics for project Gamma

No.	Project features	Project Gamma
1	Nature of project	School
2	Location of project	Greater Manchester
3	Nature of works	New build + Demolition existing school
4	Type of client	Public and private client
5	Mode of contractor selection	Competitive tender
6	Proposed project duration	25 months
7	Current stage of project	65% complete; Month 10
8	Procurement arrangement	PFI
9	Contract form	Bespoke PFI
10	Contract sum	£21 million
11	Number of subcontractors	33

7.2.3 Research Participants

Altogether, 12 interviews were conducted for the Gamma case study. Interviews were initially conducted with the procurement leader and a procurement manager at the head office to gain an overview of Gamma's supply chain management (SCM) strategy. The other 10 interviews were conducted with personnel at the project level that comprised Gamma's project-level procurement manager, supply chain manager, project manager, quantity surveyor and five (5) of their SCs. Their details are summarised in Table 7.2.

Table 7.2: Research participants for case study Gamma

No.	Organisation	Position	Gender	Age (years)	Years of experience	Qualification
1	Gamma	Procurement Leader	Male	41-50	> 20	University degree + CIPS & CIOB

No.	Organisation	Position	Gender	Age (years)	Years of experience	Qualification
2	Gamma	Procurement Leader**	Male	41-50	> 20	University degree
3	Gamma	Supply Chain Manager	Male	30-40	7-10	University degree + CIPS
4	Gamma	Project Procurement Manager	Male	41-50	> 20	HND + CIPS
5	Gamma	Project Manager	Male	30-40	11 - 15	University degree + CIOB
6	Gamma	Quantity Surveyor	Male	41-50	> 20	University degree + MRICS
7	Gamma	Construction Manager**	Male	41-50	>20	HND + CIOB
8	Flooring subcontractor	Director*	Male	41-50	>20	University degree
9	Steel doors subcontractor	Estimator	Male	30-40	7-10	HNC
10	Dry lining subcontractor	Construction Director	Male	41-50	> 20	HND
11	Catering design subcontractor	Design Manager	Male	41-50	> 20	BTEC
12	Technology supply subcontractors	Project Manager	Male	51-60	7-10	University degree

*Directors were responsible for contract management of their work package at the site level **face-to-face discussions were conducted and hand written as consent was not given for it to be audio-taped.

Interviews with the procurement leader and construction manager were however hand written as consent was not given for it to be recorded. All participants in the Gamma case study were male with the least age range of 30-40 years and a minimum of 7-10 years' experience in the construction industry. The extensive experience and respective roles of participants made them suitable for the study.

7.3 SUPPLY CHAIN MANAGEMENT PRACTICES

Similar to the Alpha and Beta case studies, strategic SCM practices of Gamma are discussed as: 1) supply chain orientation; 2) supply base management; 3) supply chain assessments; 4) long-term relationships; 5) supply chain performance; 6) supply chain IT system; 7) continuous performance improvements and 8) supply chain motivation and reward. These practices are summarized in Table 7.3.

Table 7.3: Supply chain management practices of Gamma

Features	Description of Gamma's SCM strategy
Supply chain orientation	<ul style="list-style-type: none"> • <i>Develop stronger, closer and collaborative relationship with fewer subcontractors that fit into their various initiatives.</i> • <i>30% of work subcontracted due to a transition towards in-house delivery.</i> • <i>Coordinated by a procurement leader</i>
Supply base management (size, connectedness, classification)	<ul style="list-style-type: none"> • <i>Approximately 2500 subcontractors used nationally</i> • <i>Four tiered categorization structure which is highly flexible with last tier being a temporary tier for subcontractors that are used on one-off basis.</i> • <i>Status of subcontractors on supply chain</i> • <i>High degree of connectedness* with three main tiers backed by subcontract agreements with subcontractors on these top three categories</i>
Supply chain assessments	<ul style="list-style-type: none"> • <i>Completion of online forms and invitation to interviews.</i> • <i>Visits to subcontractor premises</i> • <i>Further checks such as SSIP (Safety schemes in procurement) checks, Dunn and Bradstreet's financial assessments to verify financial and credit rating</i>
Long-term relationships	<ul style="list-style-type: none"> • <i>99% of opportunities go to regular subcontractors on the supply chain</i>
Supply chain performance	<ul style="list-style-type: none"> • <i>Performance scoring jointly undertaken by project team on monthly basis.</i> • <i>Scores are designed to identify low and high performers hence the avoidance of a middle score.</i> • <i>No performance scoring opportunity for subcontractors.</i> • <i>Performance scoring only discussed with subcontractors when outcome is poor.</i>
Information Technology	<ul style="list-style-type: none"> • <i>Proprietary IT system that is considered by project team as non-user friendly</i> • <i>Holds information on subcontractor performance and relevant subcontractor documentation.</i> • <i>Limited functionality for supporting subcontractor selection due to inability to track subcontractor performance scores.</i>
Continuous performance improvements	<ul style="list-style-type: none"> • <i>Organises workshops, visits to off-site manufacturing facility and innovation days to discuss latest innovation e.g. using phone apps to identify and report defects.</i>
Supply Chain Motivation and Reward	<ul style="list-style-type: none"> • <i>45 days payment arrangement with subcontractors which is always adhered to</i> • <i>Quarterly meeting with tier one and two subcontractors to discuss pipeline of work which was part of responsibility of procurement leader and his team.</i>

*Formal supply chain agreements with SCs in the three main levels as well as continuous interactions with relatively smaller number of SCs on supply base.

7.3.1 Supply Chain Orientation

Gamma aimed to ensure that significant proportions of construction work (at least 70%) were undertaken in-house. Thus their ambition was to only sublet 30% to their supply chain. The aim was to achieve cost savings by working with fewer SCs that bought into their DFMA agenda, whilst having more control of service delivery to their clients. This was explained by the procurement manager:

“...the idea is the benefit of improving the cost eventually, working through the system, but also working towards the way that [Gamma] operate as an engineering enterprise, which is the DFMA route,...we're looking to try and get as close as we

can to the supply chain... the overall idea is the standard 80/20 model of ensuring that we spend more with less suppliers or subcontractors”

Gamma’s in-house departments were therefore responsible for delivery of higher risk packages such as M&E work and precast concrete elements whereas the less risky and sensitive work packages were subcontracted. Gamma’s expectation was to deliver 70% of construction asset using offsite design and manufacture so as to realise a 60% target reduction in site labour and 30% reduction in the construction programme.

Gamma also operated a robust internal control and governance procedure which had been structured to ensure that no single individual had overall responsibility for procuring, placing or paying SCs. Each project had a procurement team in addition to commercial and site management teams, headed by a project manager. Gamma’s SCM functions were coordinated by the project procurement team who reported to a procurement leader at the head office. The procurement leader was further responsible to a procurement director.

7.3.2 Supply Chain Assessment

Subcontractors were required to undergo a rigorous assessment process before they were admitted onto Gamma’s supply chain. Prior to supply chain assessments, SCs had to make formal applications to the procurement leader, who evaluated if a SC was likely to contribute to Gamma’s business. Subsequently, supply chain assessments were undertaken by vetting the SC’s H&S performance, past performance information; site waste management plans and quality of their personnel.

Third party checks were also undertaken through for instance the use of safety scheme in procurement (SSIP) to identify a SC as well as Dunn and Bradstreet (D&B) financial assessments. Gamma also requested relevant references and occasionally visited SC

factories to confirm or verify information that had been provided on application forms. Gamma applied strategic thinking to these assessments by seeking the extent to which SCs could support bolt-on initiatives that were linked to their supply chain strategy such as the DFMA and H&S initiatives.

7.3.3 Supply Base Management

Gamma had recently undertaken a drastic reduction in the number of SCs they engaged on an annual basis. Their supply chain base was previously regionalised, with different branches across the UK growing their own regional approved list of SCs and suppliers. Weaknesses however emerged from this practice as the lack of coordination made it possible for a poor performer or overcommitted SC in one region to gain work in another region. The supply chain base therefore had to be reduced from around 40,000 to approximately 2500 SCs across the UK:

“...the numbers were cut down...the numbers were up at ridiculous high levels with one-off transactional orders being placed for whatever reason, and the numbers were tried to be cut down to the number of 2,500 from 40,000 odd” - **Procurement manager, Gamma**

This statement reveals the large size and *ad hoc* nature of Gamma's previous supply chain base. The previous supply base was also uncategorized but as part of the re-organisation, Gamma introduced a four level categorization structure. These 2500 SCs were thus categorised into four levels: a strategic, preferred, tactical and temporary level. SCs in the strategic level provided exclusive benefits to Gamma with regards to work winning as well as operational stage benefits such as off-site manufacture of components. SCs on the preferred level were also manufacturers and merchants that had proven track records with Gamma whereas the temporary level entailed firms that were required on *ad hoc* basis due to client nomination for bespoke elements that could not be obtained from SCs within the

three main levels. There was however fluidity in the three main levels as SCs could rise and fall between the strategic, preferred and tactical levels based on performance and strategic contributions.

The categorization structure was also aligned to the promotion of the DFMA agenda as the strategic SCs were mostly those that contributed to Gamma's off-site manufacture initiative. This reflected how Gamma's supply base management was aligned to the DFMA initiative. Gamma also signed supply chain agreements with all SCs in the three main levels although the degree of formality of these agreements differed. Strategic manufacturing and preferred supplier agreements were signed with strategic and preferred SCs respectively. However a less formal subcontractor framework and low trade agreement was signed with the tactical SCs.

7.3.4 Long-term Relationships

Gamma promoted close collaborative relationships with the few SCs that constituted their re-organised supply chain base. This was facilitated by their decision and rapid efforts to work with SCs that made contributions towards the DFMA agenda. The commercial manager described their approach to long-term relationships as a kind of partnering as remarked in this statement:

“99.9 per cent of the opportunities that people get, we only use approved subcontractors that have gone through the process of selection and have also done projects for [Gamma] on multiple occasions...It's almost a partnering approach really that's been adopted”

Gamma was thus committed to subcontracting 99% of work to SCs that had previously worked on their projects. This may have been possible because the 2500 SCs that constituted their re-organised supply chain base had previously been part of the 40,000 nationwide SCs

that engaged with Gamma on multiple occasions. Gamma's ambition to establish long-term supply chain relationships with their supply chain was further demonstrated by the formalized agreements (section 7.3.3) that were signed with SCs in the three main categorization levels. Again, most of these SCs were involved in manufacturing related activities that contributed to achievement of the DFMA agenda.

7.3.5 Supply Chain Performance

Gamma's project team scored all SCs on a monthly basis during the project. These scores were subsequently logged onto a supply chain IT system. The performance scoring was coordinated by the procurement manager who liaised with the project management team. This scoring process was explained by the procurement manager:

"...we sit around the table in a meeting and the scores operate from one to four and from six to ten, with ten being the highest performer, one being the lowest. What we're trying to get away with is to really demonstrate whether someone's a high performer or a low performer and we were trying to get away from putting a five into that scoring matrix. That's done every month through the whole project"

The scoring system was designed to target high and low performers by avoiding mid value scores. SCs were scored on H&S performance, programme compliance and quality of workmanship. These performance scores were however not disclosed to SCs except for drawing their attention to particular performance issues that required improvements. SCs were also not provided with any opportunity to reverse score the project team's performance at project completion.

7.3.6 Supply Chain IT System

Gamma's SCM practice involved the use of a proprietary IT system onto which performance scores were logged. This IT system was described by the project team as limited in its functionality and user friendliness. The project team expressed dissatisfaction about the

inability to gain any meaningful SC performance information from the IT system to support project level decision making. This dissatisfaction was well reflected in this statement by the project manager:

“...it’s like an Excel based thing that no-one understands rather than it being a good web-based system, it’s too complicated, there’s too many sections in it. I can’t pick out on it which of the packages relate to this project because it goes through every package, not just for this job, but for two other jobs...it’s just very time consuming for a simple thing. So, to fill it in, might take me an hour to do and that’s very poor. Then you don’t get any feedback off it, so I’ve worked here now for 10 years, I’ve never had any reports back to say what their score is”

The inability to gain SC performance feedback, time consumption during use, lack of user friendliness and lack of opportunity for package managers to make additional comments on SC performance (system flexibility) were revealed by the project team as weaknesses associated with their supply chain IT system. The IT system was therefore not functional for project level decision making due to the inability to generate performance feedback. The project manager narrated how he had resorted to phoning other colleague project managers to seek information about a SC that he had not personally worked with in the past. This information could easily have been queried from the IT system if it were highly functional. The project manager made this recommendation regarding their supply chain IT system:

“...[what we need is] a good scoring system, a good, easy to use, with good feedback...like Amazon rating system or trip advisor would be brilliant and all package managers would be able to go on it and just write comments and then I could just put a search in the top, [SCFI], and it would bring out all the scores, it’s simple”

Such a flexible, user friendly and functional IT system could support project level decision making, based on the level of intelligence that could be generated about SC performance and supply chain status.

7.3.7 Continuous Performance Improvements

Gamma strived to promote closer performance improvement engagements with their SCs through the use of innovation days, H&S training, quarterly strategic update meetings and regular tours for SCs to their manufacturing facilities. This was explained by the procurement manager:

“It’s bringing them all in so that they still feel as though they’re part of the overall group, rather than they hear from us one day and then they don’t hear for twelve months, and also any initiatives that we might have with regard to the manufacturing facilities...we try and get the supply chain involved with, so it may be a Health & Safety initiative, or we had recently an innovation day where we had our supply chain, and our own operatives, coming in to our facility where they were looking at various other systems that are in play, maybe a system for the iPhone which can be picked up to reporting defects”

These CPI activities therefore enabled Gamma to engage closer with their supply chain so as to progress jointly as a single entity in applying innovative ideas as well as achieve their DFMA and H&S agendas. The regular visits to their manufacturing facilities were intended to expose SCs to their DFMA initiative so that they identify where contributions could be made to support this process. Additionally, the procurement leader engaged in quarterly supply chain review meetings to evaluate SC’s contributions to the DFMA agenda, their support towards Gamma’s work winning functions and other financial issues. All these CPI activities did not only ensure that the supply chain progressed competitively as a single unit in the direction of Gamma’s initiatives, but further contributed to the gradual entrenchment of closer collaboration in the supply chain.

7.3.8 Supply Chain Motivation and Reward

Gamma had a 45 days payment arrangement with their SCs which was claimed to be rigorously adhered to given the recognition that cash flow was a typical challenge for SCs.

Gamma also engaged with SCs on regular basis to discuss upcoming work opportunities (quarterly review meetings) when there was no current work. As was explained, such meetings were coordinated by the procurement leader:

“...so the procurement leader would have a series of meetings set up with a lot of these tier 1[strategic] and tier 2[preferred] subcontractor or specialist that, literally, you would meet on a quarterly basis and see what work is going forward and that would maintain some level of contact”- Procurement manager, Gamma

The quarterly engagements were thus restricted to the strategic and preferred SCs. Gamma also rewarded their supply chain through commitments to provision of continuous work opportunity for SCs in their three main categories as discussed in section 7.3.4.

In summary, Gamma's SCM practices were tailored towards the promotion of closer collaborative relationship with SCs that contributed towards realisation of their strategic business objectives such as off-site manufacturing (DFMA) and H&S initiatives. The main drawback of their practice however, was the low functionality of their supply chain IT system for project level decision making.

7.4 MANIFESTATION OF TRUST

To understand how trust manifested in Gamma's supply chain during the project, views were sought from the different parties about what they considered important with regards to trust (trust attributes), the nature of trust that prevailed amongst the different project delivery team members and how these influenced SC selection decisions.

7.4.1 Trust Attributes

Both parties revealed competence, familiarity, reliance for help, reputation and honesty and integrity as important trust attributes. Regarding *reliance for help*, the project team

expressed the view that they repose trust in SCs that can support their work winning functions and DFMA agenda. Due to the high tendency for SCs to go bankrupt in the current recession, *reputation* of SCs was linked to their financial stability whilst *honesty and integrity* was about the extent of SC's demonstration of truthfulness. Similarly, SCs revealed reliance for help in terms of future work opportunity was an important trust attribute. They also expected the project team to be *competent* enough to provide a well organised project site whilst being a well-known 'cash rich' company (reputation) that was capable of honouring payments. Thus SCs linked *reputation* and *honesty and integrity* to timely and accurate payments for completed work.

However, SCs were exclusively emphatic about *openness* and *fair and reasonable treatment*. SCs expected that the project team to furnish them with accurate information as well as promote a no-blame approach to problem solving (openness). A summary of extracts that depict views from both parties is presented in Table 7.4.

Table 7.4: Attributes of trust from Gamma and subcontractor perspectives

Trust attributes	Gamma perspectives	Subcontractor perspectives
Familiarity	<i>"a proven track record with our business, people I've already got a relationship with and I know I can trust"</i>	<i>"companies that make us part of their team"</i>
Competence	<i>"competent specialists for each particular package from our tiered supply chain"</i>	<i>"companies that organise their project site very well"</i>
Reliance for help	<i>"people who can support our DFMA agenda and the work winning side of things"</i>	<i>"if he trusts me and I trust him, I can go to him on next job and say 'you can trust me, 'cos you trusted me on last one'"</i>
Openness		<i>"I've got to trust him that he's given me proper information and not holding a load back to just try and hit me with a stick." "If I've got a problem, I can go and talk to them"</i>
Reputation	<i>"they've got financial stability"</i>	<i>"I'll only go for premier league, I wouldn't price a job for championship."</i>

Trust attributes	Gamma perspectives	Subcontractor perspectives
		<i>Well, you don't know whether you're gonna get paid</i>
Fair and reasonable treatment		<i>"I've got to trust him that he's not just gonna put somebody in there who's just gonna make life hell for me but is fair and reasonable"</i>
Honesty and integrity	<i>"give right answers in the pre-contract meeting and you get the feeling they are telling the truth"</i>	<i>"that on day 45 my money will be in the bank" "I've got to trust him that once I've done all that, he's gonna pay me on time"</i>

7.4.2 Nature of Trust

The nature of trust that manifested in Gamma's supply chain is discussed as: 1) cognition-based trust; 2) system-based trust and 3) relational-based trust.

7.4.2.1 Cognition-based Trust

The project team had to acquire relevant SC information based on which they made key decisions. This was particularly the case when there was no interpersonal familiarity between the project team and SCs, although they might have worked on a previous Gamma project. The trust here was thus based how the project team interpreted the information they gained about SCs based on their own experience. The project manager explained how he sought information from other colleague project managers that had worked directly with a particular SC:

"...have I worked with him before?' I'll phone some of the other project managers and say 'you've worked with these before, what do you think?' and they'll say 'yeah, they're ok, we'd use them again and they'll say 'yes' and if I trust that project manager, I might put the ranking up higher, if I don't quite trust that project manager, I won't take his opinion very highly anyway"

The above statement reveals the complexity of this sense-making process. The project manager also had to access credibility of the information source (colleague project manager)

in addition to the SC information that had been provided, before forming his own psychological expectations (cognition-based trust). However, the same information could have been retrieved directly from the supply chain IT system if it were highly functional. Such a system could have been more accurate because performance records logged during the project would have been less prone to any forgetfulness or bias from the information source (colleague project manager). A highly functional IT system could also have provided a formalized alternative to the informal phone conversation that introduced an element of distrust about the colleague project manager's SC performance feedback.

This cognitive sense-making process was also influenced by initial first-time impressions as further explained by the project manager:

"...When you're sat down in the pre-contract meeting, depending on who they send, if they send the salesman or whatever, I'd start thinking 'mmm ...'but if they send the contracts director, or the managing director, that's when I think 'oh yes, these are serious for having the job'"

Thus status of the SC's representative during pre-contract negotiation meetings could influence this aspect of trust formation (cognitive-based trust).

Gamma's supply chain assessment process (section 7.3.2) also contributed to the emergence of cognition-based trust. The project team claimed that the final three to four shortlisted SCs for any work package were firms that had been thoroughly assessed, sometimes involving the use of third party pre-qualification agencies and financial auditors.

7.4.2.2 System-based Trust

System-based trust manifested through the various initiatives that Gamma promoted so as to establish joint ethos with their supply chain (section 7.3.7). The procurement manager

explained how participation of SCs in their H&S training courses gave them confidence that they had bought into their progressive H&S culture. The project team also claimed to have higher expectations when SCs had participated in other initiatives such as the innovation days, quarterly strategic update meetings and tour of manufacturing facility. This gave them the confidence (system-based trust) that such SCs knew what they wanted to achieve on their projects. System-based trust was in this sense more related to the culture and ethos that Gamma strived to promote in their business through their SCM strategy i.e. DFMA and H&S agenda.

7.4.2.3 Relational-based Trust

Relational-based trust emerged during circumstances when there was high degree of familiarity between SCs and the project team. This dimension of trust was expressed by all the interviewed SCs as they had previously been engaged with the same project team on other completed BSF series of projects. The project manager sometimes went to the extent of specifically requesting for particular gangs and supervisors that were highly trusted based on this interpersonal familiarity:

“...more important than the company is the people and it’s the people that give you a good job, so I want to pick the right people. I picked [director of SCF1] first of all as a director, then I asked [director of SCF1] for a particular supervisor on site and then if I’m getting those two people right, then I’m getting the right people on site, which means I’ll get the right quality on site. So it’s about picking the two people doing work...so that’s part of the agreement, same with flooring contractor we’ve got here, I picked the individuals who do the work.” - Project manager, Gamma

The project manager’s confidence as expressed in the above quote, and the ability to know which specific team he needed the SC to provide for the project derived from his previous engagements with the same people. This relationally derived guarantee that the right quality could be obtained if particular supervisors were brought onto the project was thus an

interpersonal phenomenon. This aspect of trust is not merely about choosing a familiar company as the project manager was emphatic about ensuring that the right delivery team were also chosen, based on knowledge from repeated past interactions. This position reflects the complexity and cascading nature of the object of trust: company-director-supervisor. SCs also acknowledged that this relational dimension of trust that derived from familiarity during previous engagements assured them of what to expect during the project.

“...again, because we’d previously worked with this particular, I mean [Gamma], from an organisation point of view, they are very good compared to other main contractors, so we knew what we were getting” - Director, Flooring SC

The above view depicts the positive expectations that the flooring SC developed based on previous working experience with Gamma. Similar views were expressed by the other SCs that had as well progressed together with the same project team from a previous BSF project.

7.4.3 Subcontractor Selection

Gamma had a stringent governance process for placement of subcontract orders. For each work package, four or five SCs were jointly shortlisted by the site procurement manager, commercial leader and project manager for subsequent approval by the procurement leader at the head office. Cognitive aspects of trust reflected at this stage as the project team were confident that SCs in the initial shortlist were capable of meeting performance requirements. These SCs were further invited for pre-order interviews where the project team sought up-to-date information on SC performance, their available resources as well as discussed any price negotiations. The need to review existing SC commitments and their available resources was emphasised as this could trigger poor performance. The project team (comprising the construction manager, procurement manager and quantity surveyor and project manager) jointly worked together to make the final selection based on a trade-off between price and the most suitable SC for the job:

“...the perfect situation is get the right company and then the right people at the right price, but if I cant...first of all, if the right company isn't at the right price, I wouldn't be able to go to them and then, if I can't get the right people, then I'll trust that company to give me someone who is just as good. I would say it works on a priority of probably price, but negotiated, then the company, then the individuals we get” - Project manager, Gamma

The project manager clearly acknowledges in the above statement that the selection priorities are in the order of negotiated price, the right company and the right delivery team that can meet project performance requirements. However when the price dilemma was negated due to firms being within the same price range, relationally derived trust became the deciding factor. The project manager explained how this situation manifested during SC selection for two work packages:

“...the painting contractor we've got there at the moment, [SC2], so I prefer working with one or two other companies, for example, [SC3]. But on an £80,000 package, the company I wanted to use were £30,000 over, so that meant I couldn't use [SC3]...[On another work package] with [SC1], so we sent that out to three or four companies, then I was hoping that one of the best companies that would come out would be [SC1]. Two companies came out best on whatever package size, £320,000 package, there was only £2,000 between both, so then I just picked [mentioned director of SC1] because I've worked with [mentioned director of SCF1] before and then we negotiated with [mentioned SCF1 Director]”

The price difference of £30,000 negated the influence of relational-based trust on the final selection decision whereas with a price difference of £2,000, relational-based trust became the deciding factor. When SCF1's director (dry lining SC) was interviewed, he acknowledged that the project manager had to get the commercial team to finally negotiate with him to get the job due to the relational-based trust that existed in the relationship. The influence of different trust dimensions on SC selection was thus highly situational. Further views were sought from SCs on the criteria based on which they felt Gamma awarded their

work packages. These are summarised in Table 7.5 according to the order in which they provided their responses.

Table 7.5: Subcontractor views on selection criteria for project Gamma

Flooring	Dry Lining	Steel Doors	Catering Design	Technology Supply
<i>Cheapest price</i>	<i>Had been involved in previous BSF projects with Gamma so learning curve was sorted</i>	<i>We had good feedback on installations in previous school projects</i>	<i>Our speed of service and proven track record</i>	<i>Confidence that we will deliver</i>
<i>Past reputation with project manager</i>	<i>Due to our value engineering inputs and best working practices</i>	<i>We were the cheapest price with negotiation that involved us offering a contractors discount</i>	<i>We had to be commercially competitive</i>	<i>Fairly niche area so there was little competition</i>
	<i>We had to be there or thereabouts with the price</i>			<i>We had to work with them to meet a limited budget</i>

The above views suggest that negotiated price and trust were both deciding factors during subcontractor selector. Cognition-based trust influenced the final selection decision when price differences were higher but shifted to relational-based trust when SCs were within the same price range.

In summary, weaknesses in Gamma's IT system limited the information they could obtain about SCs (cognition-based trust), although this weakness was compensated for by Gamma's rigorous supply chain assessment process as well as the use of fewer SCs across their projects. Gamma's CPI activities (section 7.3.7) also contributed to the emergence of system-based trust whereas commitment towards long-term relationships (section 7.3.4) contributed to relational-based trust during the project. Additionally, price received the highest priority during SC selection with relationally derived trust becoming a deciding factor when SCs were at par on price.

7.5 FACTORS THAT INFLUENCED TRUST DEVELOPMENT

The factors that influenced inter-organisational trust development during the Gamma's project are discussed as: 1) change management; 2) economic climate; 3) project specific context; 4) payment issues; 5) job performance and 6) perceived opportunity for future work. These factors are summarised in Table 7.6.

Table 7.6: Factors that influenced trust in Gamma's supply chain

Factors	Gamma	Subcontractors
Change management	<ul style="list-style-type: none"> • <i>Risky and highly variable work packages self-delivered</i> 	<ul style="list-style-type: none"> • <i>Entry and exit price usually same or at most 5-10% different</i> • <i>Positive reinforcement of trust due to assurance that changes would be fairly managed.</i>
Economic climate	<ul style="list-style-type: none"> • <i>Added value to clients through innovation, self-delivery so as to win enough projects for supply chain workflow.</i> • <i>Ease of getting good SCs on a job due to competent SC availability.</i> • <i>Increased tendency for SCs to go into administration with an occurrence during the project.</i> 	<ul style="list-style-type: none"> • <i>Increased commercial emphasis which minimizes the role that relational trust previously played in the supply chain prior to the recession.</i>
Payment on issues	<ul style="list-style-type: none"> • <i>Strict adherence to 45 days payment arrangement</i> 	<ul style="list-style-type: none"> • <i>Satisfaction with promptness of payment in accordance with 45 days agreement.</i> • <i>High level of trust with regards to promptness of payment during project.</i> • <i>Delay in retention repayments after defects liability period.</i>
Perceived opportunity for future work	<ul style="list-style-type: none"> • <i>High expectation of future work due to repetitive nature of BSF series of projects.</i> 	<ul style="list-style-type: none"> • <i>High positive outlook of future work that derived from the very repetitive nature of the BSF scheme.</i> • <i>Contributed to higher perceptions of trust as long as performance was achieved.</i> • <i>Non-award of future work on BSF scheme after high performance managed through effective communication.</i>
Project specific circumstances	<ul style="list-style-type: none"> • <i>PFI scheme facilitated repeated use of SCs.</i> • <i>Facilitated promotion of relational-based trust</i> 	
Job performance	<ul style="list-style-type: none"> • <i>Promptness in attending to performance queries a desirable attitude.</i> • <i>Drop in performance due to SCs change of management.</i> • <i>Increase in supervision to ensure achievement of performance targets.</i> 	<ul style="list-style-type: none"> • <i>Desire to always meet performance target so as to maintain supply chain relationship.</i>

7.5.1 Change Management

The high risk trades that were subject to significant changes were being self-delivered through Gamma's in-house firms. It was this factor, coupled with the fact that the bulk of work packages involved off-site manufacture and site fixing that reduced the amount of variations during the project. However, when changes occurred, these were adequately managed by the project team to the satisfaction of SCs. The flooring SC for example explained that their entry to exit price was usually the same and only changed between five and ten per cent occasionally. This SC asserted that Gamma was generally very clinical in winning jobs at the right price, avoiding any need to place financial strain on their supply chain. This same view was expressed by other SCs that claimed there were hardly any issue with Gamma on changes unlike they faced with other MCs:

“Commercially, the price was agreed and there is never an issue with that, so from that aspect, we're not getting involved in arguments of measure and rates, it's done and it's done quickly and professionally” - Director, Flooring SC

SCs had therefore become generally accustomed to good contract management from Gamma's project team that had translated into high trustfulness. SC expectations of honesty and integrity and fair and reasonable treatment (see section 7.4.1) were thus fulfilled in this regard, reinforcing trust in Gamma's supply chain.

7.5.2 Economic Climate

Gamma understood the commercial pressures in the market environment that could cause them to under-price work and consequently place a strain on their business and that of their supply chain. Having experienced cashflow difficulties during a previous economic downturn period, Gamma's strategy was to create a niche market for themselves by rapidly promoting innovation and offering clients added value and a unique service. As a result, they had been successful in attracting large enough work that could sustain their business

and that of their supply chain through periods of austerity and economic downturn. This niche service creation was what necessitated their decision to self-deliver a large component of work and avoid exposure to SC insolvencies as well as have more control over their budget. From a Gamma perspective, downturn in the economy had a positive influence on their business as it provided a better environment for them to get access to good quality and trustworthy SCs. This was explained by the project manager:

“...because there’s less work about, which means that you can be more in charge of who you can have on the job. Five or six years ago, if I wasn’t happy with their subcontractor or a particular gang on site, I couldn’t get rid of them off site because it would be very difficult to get someone else in instead of them. These days, you know there’s plenty of people looking for work, so you can replace that. Plus the lads on site know that, they know that if they lose work here, it’s not very easy to find another job on another site down the road, so they perform better knowing that. I think it’s just supply and demand” - **Project manager, Gamma**

The supply and demand changes under different economic climates thus influences the ease or difficulty of gaining access to trustworthy SCs. The above statement clearly explains the advantage that an austere economic environment presents for trust development by providing access to trustworthy SCs who are intent on maintaining their trustworthiness knowing that they are not irreplaceable.

However, there was still the challenge of SCs going into administration and the project team were always particular about their financial standing. During the project, the roofing SC went into administration and another company had to be drafted in quickly to complete the roofing subcontract:

“...the biggest problem we’ve had is one of the suppliers, [SCF4 – Asphalt company], going into administration. That’s the biggest problem we’ve had on the supply chain” - **Project manager, Gamma**

The financial standing of SCs therefore became a trust issue throughout the project as to secure work, SCs could conceal signs of eminent bankruptcy. SCs on the contrary were of the view that the downturn in the economy had increased the emphasis placed on commercial issues which tend to minimize the relevance of accrued goodwill. From their perspective, emphasis was more on commercial performance as against relational history with the project team:

“...when it gets like this in a recession as they call it, money’s tight, the QS’s come to the fore, and it becomes extremely contractual and that goodwill that was prior to all this downturn, it disappears, it disappears. The QS’s really, the commercial people, rule the roost, what they say happens. The site team might say ‘we wanna use him, we wanna use him,’ but the commercial team says ‘he’s not there on price,’ or ‘he’s contractual,’ then it doesn’t happen” - Director, Flooring SC

SCs therefore felt that relationships were more contractual than relational because of the emphasis on money, which triggered more emphasis on cognition-based as against relational dimensions of trust during periods of economic downturn. This view again was reflected during the SC selection stage as discussed earlier in section 7.4.3.

7.5.3 Payment Issues

Gamma was strictly committed to their 45 days payment arrangement which contributed to confidence amongst SCs that they would always be paid promptly. SCs acknowledged that there were hardly any delays with payment as this was usually in their account on day 45. The only issue they expressed with regards to payment was with retention release at the end of defects liability periods. A SC explained:

“Probably one of the, if not the only point, that I’d have a gripe with them about historically is getting the retentions sorted out...I’ve had some run ins with [Gamma] on retentions. I know they’re making a bit point of it now, because I think they’re seen, as a business themselves, that they’ve got a lot of retention outstanding” -Construction director, Dry lining SC

As can be seen from the SC's statement, this was the only payment issue that had historically become a problem with Gamma although there was an apparent feeling that steps were being taken to address this issue. SCs that expressed problems with retention repayments were however quick to emphasise that this was an industry-wide problem they experienced with other MCs. Thus whereas Gamma's prompt payment for work done contributed to strong confidence amongst their supply chain, there was still the tendency for delays with retention repayment to inhibit SC confidence and hence trust development.

7.5.4 Perceived Opportunity for Future Work

Gamma's strategy of giving regular work opportunities to the few SCs on their supply chain contributed to high expectations amongst SCs that they could depend on them for future work. This was further pronounced on this particular project where Gamma repeatedly used SCs that had performed successfully on other BSF projects. Thus, the interviewed SCs expressed a high level of relationally derived trust in Gamma due to strong perceptions that as long as they met performance requirements, they would be given a chance on the remaining BSF projects. A SC that had undertaken eight out of the eleven completed projects explained how this opportunity for repeat business amounted to perceived sense of partnership or marriage:

"...it's definitely a two-way street and it's building partnerships and marriages within business and getting rid of the learning curves and learning about the [Gamma] way and learning about the [SCF1] way. I think the benefits have been proven over the years that we've built a lot of large contracts together, they've been successful, and repeat business has come from those contracts for both [Gamma] and ourselves....we've done a lot of schools of [Gamma]. We've built eight out of eleven schools on the BSF" - **Construction director, Dry lining SC**

This repeat business opportunity on the BSF schemes therefore reinforced SC expectations that they would be future work opportunity on other Gamma projects. This increase in

expectation was concerned with the SC's trustfulness. Another SC explained an occasion where a regional director in Gamma called to explain that though they had performed successfully on one BSF project, there was a board level decision that another SC be given opportunity on the next project. Thus, effective high level communication was used to dispel any potential feeling of betrayal when SCs that performed successfully on previous BSF projects were not given opportunity on another job. This reveals the extent to which Gamma proactively managed SC expectations that related to future work opportunities through effective communication. This effective management of SCs expectations regarding future work opportunity was a factor that increased SC trustfulness towards Gamma. It resulted in the realisation of SC expectations of 'reliance for help' (see section 7.4.1).

7.5.5 Project Specific Context

Given that the Gamma project formed part of a PFI scheme where Gamma was part of the client (SPV known as the LEP); there was an opportunity to use the same SCs across the BSF projects in the region. This ensured that there was a learning curve and opportunity for cognitive-based trust to translate into relational forms of trust as a result of continuous working experiences with the project team. During the Gamma project, both the project team and SCs expressed the view that trust was more relational because it had developed from relational experiences from across other BSF projects that had been successfully completed. The largely relational nature of trust that manifested during the project was thus reinforced by the PFI nature of the project and the control that Gamma had in terms of their ability to bring on board SCs from previous schemes because were part of the SPV that constituted the client organisation.

7.5.6 Job Performance

The performance of SCs on the job was a very important consideration for the project team. During an internal project meeting on SC performance, it was observed how the team analysed each SC's performance. A particular issue was highlighted about reduced performance of a SC since they experienced a change in their top-level management. Thus, the project team reached a decision to monitor this SC's performance more closely as well as request that more labour be provided on site so as to achieve performance targets. The project manager later continued to explain during the interview how his main concern about job performance was the promptness with which SCs responded to any job performance queries:

“...some subcontractors, you might have issues with and they won't respond, so I know with [SCF1 director] that he will respond, but I would still send issues and notifications to subcontractors saying 'you're not performing.' Some subcontractors react and do something about it and some don't. The ones that I wanna get rid of are the ones who don't react” - Project manager, Gamma

The project manager's statement here reveals how promptness in response to performance queries contributed to confidence in SCs. These revelations explain why competence was above all considered a very important trust attribute from the project team's perspective as their prime concern was for the scheme to be completed to the highest quality and standard. SCs also acknowledged the reality that above all other concerns, there was the need to achieve the highest standard of performance on the Gamma project since this was the project team's most important consideration.

In summary, Gamma's contract management procedures, project context, timely payment arrangements, emphasis on job performance, economic climate and perceptions of future work opportunities contributed positively to trust development during the project. The only Gamma related issue that influenced trust negatively was the delay in retention release. This

could be mitigated if Gamma prioritizes prompt retention release as part of the supply chain motivation and reward aspect of their SCM practice.

7.6 FUNCTIONAL CONSEQUENCES OF TRUST

The behavioural consequences of trust as summarised in Table 7.7 were categorized into:

1) effective knowledge sharing; 2) self-organising behaviour; 3) relational flexibility; and 4) extra commitment. These behavioural consequences also had implications for satisfactory achievement of H&S performance, programme compliance, cost performance, and quality of workmanship.

Table 7.7: Functional consequences of trust in Gamma's supply chain

Behavioural consequences	Gamma	Subcontractors
Self-organising behaviour	<ul style="list-style-type: none"> • <i>Self-management by SCs with oversight checking from project team.</i> • <i>Rigorous evaluations during pre-start meetings to ensure that SCs can self-manage their works.</i> • <i>Reliance on advice from highly specialist SCs.</i> 	<ul style="list-style-type: none"> • <i>Provision of highly qualified site management staff.</i> • <i>Opportunity to demonstrate competencies due to high expectations of project team.</i> • <i>Expectations of project team sometimes derived from cognition, system and relational-based sources.</i>
Effective knowledge sharing	<ul style="list-style-type: none"> • <i>All SCs shared as much knowledge towards achievement of project objectives.</i> 	<ul style="list-style-type: none"> • <i>Keeness to make suggestions especially on achieving DFMA agenda on project.</i> • <i>Value engineering solutions proposed to help project team when trust was cognition, systems or relational-based.</i>
Relational flexibility	<ul style="list-style-type: none"> • <i>Emergence of informality when trust was more relational in nature.</i> • <i>Informality attributed to previous relationships on other BSF projects.</i> 	<ul style="list-style-type: none"> • <i>Emergence of informality due to previous relationships on other BSF projects.</i> • <i>Avoidance of any behaviour that may come across to project team as contractual.</i> • <i>Maintaining informality that had emerged due to high relational-based trust.</i>
Extra commitment	<ul style="list-style-type: none"> • <i>Support for the realisation of DFMA agenda during projects when trust is highly relational.</i> • <i>Specific request for SC personnel that had helped to achieve success on other BSF projects.</i> 	<ul style="list-style-type: none"> • <i>Providing tender assistance in support of Gamma's work winning.</i> • <i>Commitment to DFMA and H&S initiatives.</i> • <i>Influenced pricing strategy as relational-based trust contributed to more flexible pricing.</i> • <i>Provision of specific project gangs requested by project team.</i>

Behavioural consequences	Gamma	Subcontractors
		<ul style="list-style-type: none"> • <i>Gamma reciprocate through business support on raising the bar, H&S safety and even future work opportunities.</i>

7.5.1 Self-organising Behaviour

Although Gamma had strict governance procedures in place to ensure that SCs performed satisfactorily, it was acknowledged by the project team that SCs on their supply chain were relied upon to get the projects built safely and correctly. Supply chain SCs were expected to apply their specialist knowledge in completing work packages whilst the project team coordinated the delivery process. SCs demonstrated their abilities to self-manage work packages especially because these were mainly firms that manufactured different components off-site for subsequent on-site assembly. This potential of SCs to self-manage their work packages was also as a result of the project team's critical evaluation during the pre-order and pre-start meetings (cognition-based trust). Apart from cognitively-derived trust in SCs potential to self-manage their work, system-based trust also contributed to the creation of an environment where SCs displayed their capacity to work safely. The project team relied on SCs that were already familiar with their H&S practices to uphold such high standards on site. A SC narrated how the project team's knowledge and expectation in their site management team and management systems provided them the opportunity to deliver quality service in return:

“we have management on site, they know how our management ways will work within their systems, we have zero defects and we have absolutely bare minimal day work on our jobs with [Gamma], and the team out there is the same team that we've worked on two or three jobs previous” - **Construction director, Dry lining SC**

The above quotation, which was in response to why they had so far performed highly, reveals that both system and relational-based sources of trust created a project environment

that enabled them deliver quality service. SCs were keen to demonstrate their ability to live up to the project team's performance expectation. There were also instances where the project team had to rely on advice from highly specialist SCs that were best placed to solve technical problems given their extensive experience. This self-organising behaviour of SCs influenced H&S performance, workmanship standard and programme compliance. It also had an indirect influence on cost performance during instances where this behaviour was underpinned by systems and relational-based trust as learning curves that were already existent would otherwise have cost money to establish.

7.6.2 Effective Knowledge Sharing

All the interviewed SCs were keen to make suggestions that could contribute to successful achievement of project objectives. Thus, value engineering inputs were made based on SC's experiential knowledge on similar tasks irrespective of the nature of trust. Having gone through a series of BSF projects together, the relational-based nature of trust was also claimed to have fostered value engineering contributions, purely from a viewpoint that SCs kept learning from across the different projects and proposed innovative solutions during informal interactions on how to achieve better results. The dry lining SC for example narrated how in one such occasion, they had realised through informal conversations with the project team, the possibility of pre-manufacturing the toilet ceilings in one piece, with holes for lighting, sprinkler and access panel, that could then be installed in a single operation to free up working space for other trades. Thus SCs were constantly looking to propose better ways of working that especially fit into Gamma's DFMA agenda. These kinds of suggestions improved the quality of workmanship and contributed to cost and time performance as tasks became simplified through innovative solutions that required minimal time on site.

7.6.3 Relational Flexibility

The project team together with SCs revealed that as a result of increased familiarity through engagements on previous BSF projects, interactions became more informal than contractual in nature (relational flexibility). A SC revealed that on the Gamma project, the pre-start meeting that usually took a couple of hours reduced to an hour and a half because everyone had a clear understanding of what was required during the project. Other SCs claimed that they preferred the friendly trust-based atmosphere (relational-based trust) that prevailed during the project and thus, sought to avoid any behaviour that made them appear to the project team as being contractual in nature. This view is reflected in a statement by one of the SCs:

“...we try not to get contractual if possible, ‘cos it makes things a lot more formal and less friendly if you’re getting signatures and you’re asking people to send emails to confirm and things like that. That can break down trust, if you agree something with someone and then you say ‘oh, can you send me an email to confirm it,’ they think ‘oh, I’m telling you now, don’t you not believe me?’” - **Estimator, Steel doors SC**

Because trust had become relational-based for most of the SCs on the Gamma project, there was a high level of expectation that they would be treated fairly by the project team. This made SCs proceed with work without resorting to over formalization that could reflect a lack of trust towards the project team. This flexibility in relationships between the project team and SCs promoted an atmosphere where SC’s could have frank and open discussions when things went wrong without the fear of any contractual retributions, enabling works to progress smoothly without delays arising from disagreements.

7.6.4 Extra Commitment

Extra commitment was demonstrated by supply chain SCs through the provision of better quality tenders as a form of assistance towards Gamma’s work winning functions.

According to interviewed SCs, Gamma were considered more reasonable than other MCs with regards to how they awarded work as well as fairness with payments. The catering design SC for example revealed that they were currently helping Gamma with projects towards the next year at their own risk without charging any money for their specialist assistance. They were however confident that such assistance would translate into future work opportunities like they had experienced in the past. Another SC explained how relational-based trust also influenced their pricing strategy:

“I could price a job for [Gamma], let’s say this job, you put this job here and you put the same job in that field and you have [Gamma] running it and you have [mentioned another large UK main contractor] running it and I’d price this job, let’s say I priced this job at ten per cent, I’d have to price that job probably about 17½ per cent to come out with the same result” - Director, Flooring SC

Subcontractor’s relationally derived awareness of the potential challenges they were likely to experience with particular MCs – a reflection of their negative expectations – influenced their pricing strategy as they factored such perceptions of distrust into their tender prices. This could have implications for cost performance of a project. SCs that had developed relational-based trust with the project team were thus more trustful and more likely to help out Gamma (extra commitment) in the interest of their supply chain relationship.

This extra commitment in the presence of relational-based trust was also reciprocated by Gamma. A SC explained how Gamma assisted their business by providing personnel on different occasions to give talks to their management about ‘raising the standard’ as well as assisting with presentations during their H&S days. Such assistance was claimed to have helped improve their business, reflecting the mutual commitment that existed in their supply chain relationship with Gamma. These committed SCs were those that worked to support the achievement of Gamma’s DFMA and H&S initiatives on the project.

In summary, the manifestation of cognition, system and relational-based trust amongst the interviewed SCs during the Gamma project contributed towards the realisation of self-organisation, effective knowledge sharing, relational flexibility and extra commitment. These behaviours were displayed by all SCs as Gamma's SCM strategy was well coordinated and had contributed to the emergence of the three trust dimensions.

7.7 SUMMARY

The SCM practices of Gamma, which were aligned towards their off-site manufacturing (DFMA) and H&S initiatives, have been discussed as comprising: supply chain orientation, supply chain assessments, supply base management, performance scoring, CPI, long-term relationships and supply chain motivation & reward. Except for weakness in their supply chain IT system's functionality, Gamma's rigorous supply chain assessments, CPI activities and shift towards a smaller supply chain base (greater interconnectedness) contributed to the emergence of cognition, system and relational-based trust respectively. The trust attributes that were revealed as important to both Gammas' project team and their SCs were also concerned with expectations that derived from their SCM practices. Factors such as fair management of changes, timely payments (supply chain motivation and reward), and high perceptions of future work opportunities (long-term relationships) have also been discussed to have contributed to SC trustfulness.

On the contrary, job performance (linked to supply chain assessments and monthly performance scoring) contributed to the project team's trustfulness in their SCs. The only aspect of Gamma's payment arrangements that required improvement was the issue of retention repayment. The cognition, system and relational-based aspects of trust that emerged from Gamma's well-structured SCM process translated into functional consequences which have been discussed as self-organisation, effective knowledge sharing,

relational flexibility and extra commitment. SC's trustfulness in Gamma enabled them demonstrate relational flexibility and extra commitment towards the realisation to the DFMA agenda. These behaviours were also essential for the achievement of quality workmanship, programme compliance, cost and H&S performance. The next chapter (Chapter Eight) presents findings from the Delta case study.

CHAPTER EIGHT: CASE STUDY DELTA

8.1 INTRODUCTION

This chapter presents findings of the Delta case study. The background is first outlined before discussing findings on Delta's SCM practices, trust manifestation, factors that influenced trust development and the function consequences of trust during the Delta project. These findings are presented in accordance with the research aim, which sought to investigate SCM practices adopted by selected UK MCs and its consequent influence on inter-organisational trust development. This chapter thus contributes to meeting objective four of the research.

8.2 CASE STUDY BACKGROUND

The background of the case study, which comprised the background of Delta, description the Delta project and some background information about the research participants were considered important for ensuring that findings from this case are interpreted within context.

8.2.1 Background of Company

Delta is a major player in the UK construction industry that employs over 50,000 personnel globally and generates annual revenues of approximately £2.3 billion. Delta was founded in 1930 although their origin could be traced back to the 1980's. They were similarly ranked amongst the top 10 of UK construction firms by annual turnover in 2012. Delta had regional offices across England, Scotland and Wales. The Midland office of participated in this study.

8.2.2 Case Study Project Description

Project Delta was a civil engineering project that involved the construction of a waste transfer station on an old industrial estate (brownfield site). The site had previously been used for disposal of disarmed ammunitions although a few had to be disarmed by ammunition squads that worked alongside the demolition contractor. The project entailed demolitions on the original site, new-build sections, road construction and other refurbishment works. The new-build section comprised the construction of a waste transfer station building (4000m²) with 200 tonnes of galvanised structural steel and Kingspan microrib composite panel cladding. The project also involved the installation of a weighbridge facility as well as construction of a new roundabout and access roads. Altogether, 80% of the project was new-build whilst the other 20% involved refurbishment works. The project clients were a local council and private waste management group that had been contracted to manage solid wastes within the council area.

The contract was administered using a JCT Design and Build (D&B) contract form with additional bespoke amendments that had been incorporated by the joint clients. The Delta project, which commenced in October 2011, had 17 months project duration. The project was 35% complete when data collection commenced at the project level in March 2012. The project was subdivided into approximately 50 subcontract packages which were sublet to 10 major SCs; with a few others involved in minor one-off works such as road marking, mine capping, road signs and drainage CCTV surveys. The local council requested that Delta promote the use of local companies whereas some SCs were also recommended by the waste management experts. Details of project Delta are summarised in Table 8.1.

Table 8.1: Project characteristics for project Delta

No.	Project features	Project Delta
1	Nature of project	Waste recovery centre
2	Location of project	West-Midlands
3	Nature of works	80% new works and 20% refurbishment
4	Type of client	Both private and public
5	Mode of contractor selection	Negotiation
6	Proposed project duration	17 months
7	Current stage of project	35% complete; Month 5
8	Procurement arrangement	Design and build
9	Contract form	JCT contracts with amendments
10	Contract sum	£ 13 million
11	Number of subcontract packages	50

8.2.3 Research Participants

Altogether, nine (9) in-depth face-to-face interviews were conducted for the Delta case study. These comprised three (3) key personnel from Delta i.e. the procurement manager at the head office and subsequently the commercial and project manager at the project level. Six (6) SCs were also interviewed during the project, although the M&E SC was an in-house Delta subsidiary. All the interviewees were male and except the quantity surveyor of the general contractors responsible for the administration block construction, all interviewees had at least 11 years' experience in the construction industry. They were all aged above 30 years with either trade qualifications, university degrees and industry recognised professional affiliations. The extensive experience and respective roles in procurement and contract management related activities made them ideal for the study. The background of interviewed participants have been summarised in Table 8.2.

Table 8.2: Research participants

No.	Organisation	Position	Gender	Age (years)	Years of experience	Qualification
1	Delta	Procurement Manager	Male	51-60	>20	University Degree
2	Delta	Commercial Manager	Male	41-50	11-15	University Degree + MRICS
3	Delta	Project Manager	Male	41-50	>20	University Degree
4	Structural Concrete Contractor	Quantity Surveyor	Male	41-50	11-15	HND
5	General Subcontractor	Quantity Surveyor	Male	>30	4-6	University Degree
6	Structural Steel Subcontractor	Operations Director	Male	30-40	11-15	University Degree
7	Demolition Subcontractor	Project Coordinator	Male	30-40	>20	University Degree + NFDC
8	M&E Subcontractors*	Contracts Manager	Male	30-40	4-6	Trade Qualification
9	Surfacing Contractors	Estimator	Male	30-40	11-15	University Degree

*This firm is a subsidiary of Delta although they also went through prequalification and had a subcontract agreement in place with Delta.

8.3 SUPPLY CHAIN MANAGEMENT PRACTICES

The key features that emerged from the analysis of Delta's SCM practices are similarly discussed under the following eight themes: 1) supply chain orientation; 2) supply base management; 3) supply chain assessments; 4) long-term relationships; 5) supply chain performance; 6) supply chain IT system; 7) continuous performance improvements and 8) supply chain motivation and reward. These are summarised in Table 8.3 and discussed below.

Table 8.3: Supply chain management practices of Delta

Features	Description of Delta's SCM strategy
Supply chain orientation	<ul style="list-style-type: none"> Subcontracts approximately 80% of workload annually To give well known and trusted contractors more opportunity to secure work. Supply chain activities coordinated by a procurement manager.
Supply base management (size, connectedness, classification)	<ul style="list-style-type: none"> Approximately 10,000 registered subcontractors on database with some degree of subcontractor connectedness*. Large but fairly stable supply chain base with three levels of classification (strategic, preferred and general registered). Subcontractor status on database is not explicitly made known to them

Features	Description of Delta's SCM strategy
Supply chain assessments	<ul style="list-style-type: none"> • Supply chain interviews and collection of necessary references. • Transition to business to business (B2B) interviews with potential subcontractors. • Health checks to ensure that the subcontractor understands the vision they want to realise.
Long-term relationships	<ul style="list-style-type: none"> • 50% of subcontract orders annually placed with strategic and preferred subcontractors. • Long-term relationships with strategic and preferred subcontractors
Supply chain performance	<ul style="list-style-type: none"> • Performance scoring undertaken by project manager • Performance scoring comprising 20 questions on H&S, quality and other aspects of subcontractor performance. • Opportunity to provide additional comments to explain any specific issues on SC performance. • Subcontractors are given the opportunity to rate the project team's performance at the end of the project. • Performance scores not actively discussed with subcontractors except when needed.
Information Technology	<ul style="list-style-type: none"> • Bespoke IT database system • Holds information on subcontractor performance spending levels and key contacts.
Continuous performance improvements	<ul style="list-style-type: none"> • Supervisor training initiatives for strategic and preferred subcontractors especially on H&S • Allocation of key contact to each subcontractor to meet at least twice a year and discuss avenues for improvement and progress with relationship. • With these efforts, emphasis is placed on preferred and strategic SCs.
Supply Chain Motivation and Reward	<ul style="list-style-type: none"> • Continuity of work for strategic and preferred subcontractors. • 35 days payment arrangement which met 95% of the time. • Early payment for discount scheme • Assisting subcontractors to develop, diversify and expand their business • Directors engage with SCs to talk and discuss further work opportunities

*Large size of supply base with no formal supply chain agreements although priority was placed on strategic and preferred SCs.

8.3.1 Supply Chain Orientation

Delta subcontracts approximately 80% of work on annual basis and had implemented SCM as a strategy to properly manage SCs that delivered this component of work across their various projects. Delta's SCM department was headed by a procurement manager who made this remark about their SCM strategy:

"...our view on supply chain management is to give some contractors we know and we trust more opportunity to secure more off our business rather than just having an open tender system where the cheapest price wins"

The above statement reveals that Delta's SCM was considered a strategy to promote repeat business with highly trusted SCs. The procurement team, headed by the procurement manager were responsible for setting Delta's SCM strategy which was then implemented at

the project level by the commercial and site management teams, headed by a project manager.

8.3.2 Supply Base Management

Delta had a large supply chain base that was categorized into three levels. This supply chain base was described by the procurement manager:

“...we have our strategic, preferred and registered subcontractors. Registered we would have not more than 10,000 registered contractors...subcontractors start at level one and then they have to have worked for us for a while before they sort of, will possibly then increase to a preferred or a strategic status”

The ascendance of SCs on the supply base was based on an interview process where they had to demonstrate to the procurement manager that they were not only willing to complete work on time and to budget but also to buy into Delta's mission statement, vision and core values i.e. potential long-term benefits for Delta. This was after SCs had worked with Delta for a considerable period of time and demonstrated satisfactory performance. Although SCs that were interviewed at the project level were aware that Delta practiced SCM, they were generally not aware of their present status on the supply base as explained by one SC:

“I know their supply chain management is not as clear as yes you're on and no you're not. It can be a bit vague sometimes although I do know we tender for a lot of their work” - **Project coordinator, demolition SC**

This SC's claim reveals that though Delta continued to provide repeat business opportunities to their supply chain, there was limited clarity about SC's status on their supply chain base. The procurement manager had however earlier indicated that Delta concentrated on meeting commitments to their supply chain rather than overemphasising on SC's supply chain status:

“There is a lot of construction firms out there who say yes, we're doing supply chain management, and then they don't actually deliver what they promise. At least, we can prove that we are giving a greater percentage of work to our preferred and

strategic rather than just saying yea, you are preferred and all the rest of it” -

Procurement manager, Delta

Thus Delta did not capitalize on stimulating competition amongst their supply chain SCs through the attainment of a higher supply chain status. This categorization was only known to Delta’s personnel, who ensured that those in the preferred and strategic levels attracted a greater percentage of work annually. This resulted in some degree of connectedness between Delta and their supply chain SCs, especially those on strategic and preferred levels.

8.3.3 Supply Chain Assessments

Delta undertook formal supply chain interviews to identify if SCs were suitable to get onto their supply chain. However there were current plans to replace such interviews with less formal business-to-business (B2B) interviews as explained by the procurement manager:

“Rather than a supply chain interview, because a lot of people are doing them and the subcontractors are fed up with, so we’re looking at doing a business to business interview. So basically, we will go along and we say right, this is our strategy, this is our supply chain, this is our sustainability, this is our business processes, what have you got, and then just give them a health check to make sure they are not aligning their business to the way we operate but they understand”

The supply chain assessment process was thus described as a form of ‘health check’ to ensure that SCs were aligned to fit into Delta’s ethos and high standards. Delta therefore undertook audits of SCs’ business processes and performance standards, which sometimes required the provision of relevant references and pre-qualification from third party organisations. The supply chain interviews were mostly initiated when Delta required new SCs from a local area.

8.3.4 Long-term Relationships

Delta promoted long-term supply chain relationships by ensuring that 50% of work was subcontracted to their strategic and preferred SCs annually. This claim was made by the procurement manager:

“..50% of our subcontract orders is required to be placed with our top two levels. So that is something that I manage from the centre and report on”

The above statement reveals a deliberate effort to monitor and report on the ambition to spend 50% annually with their strategic and preferred SCs. There was thus emphasis on their strategic and preferred SCs, which explains the higher degree of connectedness that existed with firms in these two levels.

8.3.5 Supply Chain Performance

The project manager was responsible for evaluating performance of SCs during the project through an approved questionnaire. The project manager explained that he often preferred to jointly undertake the scoring with SCs so that they could be given an opportunity to improve where necessary. This scoring, which was undertaken at the end of the project was described by the project manager:

“...officially we'll do a K9 review, it's 20 questions that you go through, we review their performance, that goes back to the procurement manager, he will keep that on the database so when I go to look for a contractor, I can go on there and go, he had an 8 here, here he had 9 you know, here he's only got 6 or 5 out of 10...health and safety, quality, there is anything on there about performance so on the database you can put comments weather they are any particular issues with performance, reliability, that sort of thing”

There was the opportunity to provide necessary comments about SCs in addition to performance scores that could guide further selection decisions on other projects. Performance scores were then stored electronically for future retrieval. The procurement

manager made an additional claim about the opportunity SCs were given to undertake a reverse scoring on performance of their project team. However the interviewed SCs indicated their unwillingness to score performance of Delta's project team at the end of the project.

8.3.6 Supply Chain IT System

Delta had a bespoke supply chain IT system that was used to manage their supply chain. This IT system held information on SC performance, previous orders and key contacts for the different trades. The supply chain status of SCs with regards to categorization levels was also held on this IT system which was adjudged to be highly functional in guiding SC selection decisions at the project level. The procurement manager described the functionality of their IT supply chain:

“...the way the vender database works is, if you're looking for a particular trade, say you want a structural steel worker, it will always display the strategic and preferred band at the top and then we go onto the general registered contractors, and it then also displays in performance order. So the higher the performance, the further up the list they come. And you get an instant snapshot of how many orders they have had in the last two years, how much we paid them, see who's doing the big works, who's doing the small works so you can sort of narrow your search down”

The above quote explains how the supply chain IT system was used by project teams to obtain SC performance information that was relevant during order placements at the project level. It was onto this IT system that close-out performance scores were also logged. The project team were therefore able to review previous SC orders, performance scorings and supply chain status i.e. registered, preferred or strategic for different trades. The bespoke nature of this IT system also made it user friendly for the project team, with flexibility for any additional SC comments that required attention.

8.3.7 Continuous Performance Improvement

Delta ensured that SCs had met certain training criteria before their status were upgraded on the supply chain database. They initiated training activities for SC supervisors that did not have the necessary training and certification on H&S. These CPI activities were however more pronounced amongst their preferred and strategic supply chain SCs as was explained by the commercial manager:

“...we expect from our level two three supply chain you know, their supervisors ought to have carried out a level two health and safety course, we took an initiative as a company a few years ago to subsidise those courses for our supply chain to get them through it, and we ought to have a supervisor from them on site at all times, so he’s buying on again into sort of further values and processes of how we work”

These training efforts for supervisors focused on H&S working practices. Delta subsidised such H&S training to ensure that SCs fully understood and observed their H&S working processes during the project. Such training efforts ensured that the supply chain bought into Delta’s values.

Delta also hosted collaborative workshops for their preferred and strategic SCs. This was previously in the form of supply chain days where SCs met with Delta to discuss new opportunities, avenues for improvement and future relationship benefits. This had however been impeded in the last few years due to the economic downturn. The current practice was thus for preferred and strategic SCs to have biannual supply chain review meetings with procurement team members that had been allocated to them:

“...what we do is for each of our preferred and strategic subcontractors, we give them a key contact. So on the vendor database, there will be a key contact from our business and they are supposed to contact their subcontractor at least twice a year. Just have a general chat. There should be a two way communication even when there is no work” - Procurement manager, Delta

This alternative approach simplified the engagement process as personal contact was made with preferred and strategic SCs to discuss performance and future prospects at least twice a year. This arrangement also helped to foster supply chain relationships during circumstances when there was no on-going work.

8.3.8 Supply Chain Motivation and Reward

The main strategy that Delta adopted to motivate and reward their SCs was by providing continuity of work through long-term supply chain relationships with strategic and preferred SCs (see section 8.3.4). This was considered by Delta as more motivating to SCs than initiating any supply chain award scheme as explained by the procurement manager:

“I know some of our competitors out there give an annual award to their best performing subcontractors; we don’t tend to do things like that because sometimes, it’s a bit hollow. The problem is if we give a supply chain award, and then the relationship breaks down, it just makes a bit of a nonsense...So continuity of work is one of the best rewards that you can give to your supply chain.”

The above statement reveals that Delta was aware of dissatisfaction amongst SCs that had previously received best SC awards from other MCs without gaining future work opportunities. The procurement manager also continued to explain how they ensured that SCs were paid promptly during the project based in accordance with their 35 days payment arrangement:

“We always, in 95% of cases, we pay on 35 days, we don’t withhold money, we don’t need to, we are cash rich, so as a result, we’ve got no reason to do like some of our competitors do where some of the supply chain wait up to 120 days before they are paid”

This 35 days payment arrangement was thus revealed to be the case 95% of the time. Delta also motivated their SCs by implementing an early payment for a discount scheme, knowing that cash flow was the biggest problem for SCs. This was to help SCs improve their cash

flow and avoid higher interest rate charges on any bank loans. The commercial manager made this remark about the early payment for discount scheme:

“we have had a few positive comments from subcontractors who haven’t normally worked with us who have come here, and we’ve sort of said you know, for a small discount we can do 14 days payment and they’ve sort of said, ok but I don’t really believe you can do it and we have done it and we’ve had some positive feedback from them”

Thus Delta charged a small discount for an alternative 14 days payment as against their 35 days arrangement. Unfortunately, none of the interviewed SCs had benefited from this scheme and so could not provide any feedback on the impact this had on their cash flows. Delta also claimed to motivate SCs by helping them expand their business into new ventures through advice, support and work opportunities in new areas. This was evidenced during the project when the structural concrete SC had been helped to diversify into drainage and groundworks. The structural concrete SC acknowledged how Delta had helped them grow their business during a 12 year period, expressing satisfaction for the opportunity to undertake drainage and earthworks in addition to their traditional structural concrete speciality. Delta was thus committed to assisting SCs in growing their business - as a reward for their high level performance.

In summary, though Delta’s supply chain categorization system was sometimes vague from SC perspectives, they continued to be committed to the provision of continuous work opportunity for their strategic and preferred SCs. In addition, Delta motivated and rewarded SCs through prompt payment; early payments scheme as well as assistance for SCs to expand their business by diversifying into new areas. Delta’s SCM practices were however focused on their preferred and strategic SCs.

8.4 MANIFESTATION OF TRUST

To understand how trust manifested in Delta's supply chain during the project, views were sought from the different parties during the project about what they considered important with regards to trust (trust attributes), the nature of trust that prevailed amongst the project delivery team members and how this influenced SC selection decisions.

8.4.1 Attributes of Trust

The important trust attributes that were expressed by both Delta's project team and SCs were *familiarity*, *reliance for help* and *honesty and integrity*. Regarding *reliance for help*, the project team expected SCs to help them out on site whilst SCs considered it important that Delta provided them with future working opportunities. Regarding *honesty and integrity*, the project team were primarily concerned that SCs would be honest about defects whereas SCs emphasised the need for Delta's honesty about any hidden costs associated with work packages.

However, SCs in particular emphasised *fair and reasonable treatment* as an important trust attribute as they expected to be paid promptly and fairly. The project team also emphasised *competence*, *openness* and *reputation* as important trust attributes. Competence was expressed with regards to the SC's ability to self-manage their works satisfactorily. Interview extracts that depict these different views have been summarized in Table 8.4.

Table 8.4: Attributes of trust from Delta and subcontractor perspectives

Trust attributes	Perspectives from Delta	Subcontractor Perspectives
Familiarity	<i>"people I have used before that I know I can trust and know what to expect"</i>	<i>"Those who are used to how we work and understand that our systems are quite rigorous and everything is in place"</i>
Competence	<i>"somebody I can trust and rely on that you can give them a set of work and all you've got to do is you can do a few"</i>	

Trust attributes	Perspectives from Delta	Subcontractor Perspectives
	<i>checks on them, you're not looking after them all the time"</i>	
Reliance for help	<i>"going above and beyond, getting involved and trying to help us out"</i>	<i>"give us the opportunity to get on the tender list for another project"</i>
Openness	<i>"because of the way we operate, honesty and openness, ok, we were too busy, we shouldn't have taken it on"</i>	
Reputation	<i>"reputable companies as that gives you that bit of confidence because they've got their reputations to think of as well"</i>	
Fair and reasonable treatment		<i>"that we are paid on time, as per our valuations, and we're not on extended payment terms"</i>
Honesty and integrity	<i>"honesty where subcontractors would come to us and admit to a defect and we'll look at it and how we're going to deal with that"</i>	<i>"Being given what we were promised so there's no sort of hidden costs and charges for us doing works"</i>

8.4.2 Nature of Trust

The nature of trust that prevailed in Delta's supply chain was also of three dimensions as revealed from the analysis. These were: 1) cognition-based trust; 2) system-based trust and 3) relational-based trust.

8.4.2.1 Cognition-based Trust

Cognition-based trust derived mainly from the supply chain assessments as described in section 8.3.3. Cognition-based trust also manifested during the selection stage when the project team sought to acquire as much information on SC capabilities through pre-order interviews as well as during subsequent pre-start meetings. The information that was sought by Delta's project team during such engagements was confirmed by one of the SCs:

"...ranged from my personal qualifications through to, the guys that are on site, what are their qualifications, capabilities, standards? They wanted a brief history of what we did, things like that" - **Operations director, Structural steel SC**

According to the project team, such evaluation meetings lasted about three hours when they had never used a SC in the past. This was a sense-making process where the project team

had to develop positive psychological expectations (trustfulness) based on acquired information (trustworthiness of SCs). During the Delta project, the project team further engaged with unfamiliar workers to develop confidence that they were knowledgeable about their tasks. The project manager explained how he walked around interacting with unfamiliar workers so as to gauge their competence levels:

“...structural concrete side probably I would say 75% are the same people, steel fixing gang, they’re new faces but I’ve spent a couple of hours out on site last week getting to know them, just having a walk around and watching them, a couple of minor issues on the rebar issues that we sorted out and so you can tell that they knew what they were doing” - Project manager, Delta

These first-time interactions therefore became necessary with the unfamiliar steel fixing gangs as against the already familiar structural concrete workers. The above interview extract reveals that cognitive-based trust became necessary when SCs or their project gangs were unfamiliar to the project team. Such informal engagements by the project manager were used to acquire knowledge about capabilities and competencies of unfamiliar gangs that could provide confidence that they were capable of performing satisfactorily.

8.4.2.2 Systems-based Trust

System-based trust emerged from the joint ethos that was realised through Delta’s CPI activities (see section 8.3.7). The supervisor H&S training and certification and biannual supply chain review meetings were all factors that contributed towards the emergence of system-based trust. This was particularly with regards to H&S and quality practices where the project team became confident that SC supervisors had already bought into their ethos and values by undergoing the necessary training. System-based trust also emerged when the project team were aware that a SC had previously engaged with Delta, albeit never working

with them personally. It was further claimed for example that the structural concrete SC had implemented some of Delta's quality assurance processes within their own business:

"...because we've developed them as a company, they've taken parts of our quality assurance process and they're actually applying it to their own business so it's almost like a back to back quality system" - **Commercial manager, Delta**

Thus the project team's awareness of such 'back-to-back' quality systems provided a degree of confidence that the SC would meet quality performance requirements during the Delta project. This confidence that emerged through already established ethos and joint knowledge of working procedures was evidenced by the relatively shorter time spent on otherwise lengthy pre-start meetings.

8.4.2.3 Relational-based Trust

Delta's project team acknowledged the emergence of relational-based trust that through repeated interactions with SCs. Relational-based trust was concerned with interpersonal relationships that had been cultivated with particular project gangs. The project manager explained how relational-based trust emerged from interpersonal relationships with the structural concrete SCs:

"...some of the lads that are here are lads that I had on the site ten, twelve years ago and they have been here three, four weeks now, the fact that it's the same people, they're not changing gangs while they've been here so the gangs that started are still here, that's good" - **Project manager, Delta**

The project manager's positive expectations (trustfulness) in this instance emerged from repeated engagements with the same SC gangs during a 10-12 years period. Thus if these working gangs were swapped consistently, trust could likely have switched to a cognition or system-based dimension. On the contrary, SCs also acknowledged that relational-based trust emerged from continuous face-to-face interactions with the project team. SCs however emphasised that the large size of Delta and the large number of project teams they had

restricted relational-based trust to the site teams they had worked with on numerous occasions. One SC remarked:

“...the main contractor[Delta], the size of the company they are, they’ve got a lot of different site teams so you might know one site team very well, come to the other site and you don’t know anyone and then you’re almost building up from scratch again”

– **Quantity surveyor, General SC**

This large size of Delta and the different divisions they operated thus restricted the emergence of relational-based trust to the few familiar Delta project teams, therefore requiring a considerably long period of time for SCs to develop relational-based trust across different project teams within Delta.

8.4.3 Subcontractor Selection

During project Delta, the project and commercial manager worked together to shortlist three or four potential SCs from their supply chain IT system that were considered satisfactory for a work package. Enquiries were then sent out to shortlisted SCs for pricing before they were subsequently invited for pre-order interviews. These interviews were undertaken to verify the accuracy of information supplied by SCs in a questionnaire that accompanied the tender enquiries as well as discuss their tender figures. This process was thus an evaluation of the SC’s trustworthiness, based on which the project team developed trustfulness in SC capabilities (cognition-based trust) when there was no prior familiarity. Delta’s project team (commercial and project manager) then made a final selection based on the price competitiveness and perceived trustworthiness of a SC. Price was however considered the deciding factor during this selection process. A regular and highly trusted SC described the informal negotiations that occurred with Delta:

“You could be trying to pick a job up for £1million and they’re telling you they’ve got a price for £900,000, yours is £950,000...they could be trying to chip you down, we just don’t know, but you weigh up things, you know where you can go to meet your rating” – **Quantity surveyor, Asphalt & tarmac SC**

The above statement depicts the price emphasis during final negotiations where SCs had to also make their commercial evaluations to arrive at optimum commercial decisions as a business. SCs were further asked to provide views about the main criteria for which they felt they were awarded their work package on the Delta project. These views have been summarised in Table 8.5 in a chronological order of their responses. These responses suggest that commercial competitiveness was a key requirement although the selected SCs had previous experience with Delta.

Table 8.5: Subcontractor views on selection criteria on project Delta.

Demolition	Structural steel	General subcontractor	Structural concrete	M&E	Tarmac Surfacing
<i>Familiarity with site conditions due to previous engagement by client.</i>	<i>Worked on a similar scheme with Delta recently</i>	<i>Worked on a similar scheme with Delta recently</i>	<i>Commercially competitive</i>	<i>Subsidiary of Delta</i>	<i>Commercially competitive</i>
<i>Commercially competitive with provision of contractors discount</i>	<i>Commercially competitive</i>	<i>Commercially competitive</i>	<i>High level of competence from previous working relationship</i>		<i>Our high level of competence and reputation.</i>
<i>Recommended by the client</i>					

In summary, Delta's SCM processes contributed to the emergence of cognition, system and relational-based trust, which were all considered during SC selection on the Delta project. Their functional supply chain IT system, commitment to promoting repeat business with preferred and strategic SCs and CPI activities were all SCM practices that contributed to the emergence of trust across the three dimensions. Price competitiveness was however a key requirement that had to be met by all SCs irrespective of the relational nature of trust.

8.5 FACTORS THAT INFLUENCE TRUST DEVELOPMENT

The factors that influenced inter-organisational trust development during the Delta project are discussed as: 1) change management; 2) economic climate; 3) project specific context;

4) payment issues; 5) job performance and 6) perceived opportunity for future work. These factors are summarised in Table 8.6.

Table 8.6: Factors that influenced trust in Delta's supply chain

Factors	Delta	Subcontractors
Change management	<ul style="list-style-type: none"> Ensuring that SCs were fairly paid for any changes. Disagreements on claims were quickly discussed with SCs to avoid any delays. Proactive attitude to managing change limited the number of issues that cropped up. Confidence in the change management process was demonstrated by SCs. 	<ul style="list-style-type: none"> Keeping accurate records on changes which was a tedious accounting exercise. Project team even made additions where some figures were skipped. Proactive attitude of project team to managing changes positively reinforced trust.
Economic climate	<ul style="list-style-type: none"> Highly competitive market where commercial factors dictate final decisions. Market testing prices to ensure that prices from supply chain SCs were not overboard. High tendency for SCs to go into liquidation. Rigorous financial checks and continuous monitoring of financial situation of SCs. Critical evaluation of invoices during project. 	<ul style="list-style-type: none"> Highly competitive market where commercial factors dictate final decisions. Being highly competitive to avoid sending signal to project team that pricing is unfair.
Payment on time	<ul style="list-style-type: none"> Recognition that cash flow is the most important consideration for SCs. Ensuring that SCs are paid according to 35 days payment policy or even earlier. Payment practices used as part of SCM strategy to build trust with SCs. 	<ul style="list-style-type: none"> Satisfaction with the project team's promptness with payments. Exemption from retention deductions due to high trust. Prompt payment of retention deductions for previous projects completed. Payment practices reflect high trust in Delta.
Perceived opportunity for future work	<ul style="list-style-type: none"> Used regular SCs especially on major and highly specialist work packages. 	<ul style="list-style-type: none"> High expectation of being rewarded on future project once high performance was demonstrated. Demolition SC had already won another project after success on this project. High expectation influenced demonstration of trust building behaviours.
Project specific circumstances	<ul style="list-style-type: none"> Client influence on SC selection process. Unknown SCs that were recommended by client or selected from local area made trust more cognitive. Lengthy process of evaluating unknown SCs in addition to closer monitoring. One-off and highly specialist project that required use of specialists that had delivered similar project in the past. 	

Factors	Delta	Subcontractors
Job performance	<ul style="list-style-type: none"> • <i>Most concerned about SCs providing a high quality of service and complying with the programme.</i> • <i>High level of job performance contributes to high trust in SC.</i> 	<ul style="list-style-type: none"> • <i>Demonstrating high level of performance the most important factor to building trust.</i> • <i>Providing the project team with regular updates that keeps them informed.</i> • <i>Working hard to meet update of work plans that is communicated to project team.</i>

8.5.1 Change Management

The project team's proactive approach to change management positively influenced trust development. The commercial manager explained that as at six months into the project, there had only been two or three occasions when they had to revise SC valuations for payment because they felt they had over-claimed. The project team also used accurate record keeping to maintain transparency. The demolition SC explained how Delta in one instance drew their attention to quantities they had skipped in their own records:

"...they are looking at it more tightly, they are requiring a lot more documentation from us, especially on the movement of waste because then you can retrospectively calculate the cost...I had to issue all the waste transfer notes on a daily basis, all the materials that were shifted had to be presented to [Delta] weekly and they would go through and say, but you've missed one because they recorded every load that went off site as well and the two had to match up so it was quite a tedious accounting exercise"

The above statement reveals how the project team used accurate record keeping to manage changes transparently on the demolition work package although this was considered a tedious accounting exercise. The project team's honesty (trustworthiness) was demonstrated when they notified the SC that they had underestimated the waste moved from the site. Against the backdrop of SC expectations regarding fair and reasonable treatment and honesty and integrity (see section 8.4.1); such change management procedures were considered positively influential to trust development. The commercial manager also

claimed that because SCs were confident that changes would be fairly valued for subsequent payment, they were always keen to undertake any extra work that was required during the project.

8.5.2 Economic Climate

The economic decline was acknowledged by both the project team and SCs to have resulted in a highly competitive market environment where commercial factors dictated most decisions. Commercial competitiveness of SCs had become a trust issue as Delta's commercial department resorted to market testing prices that were submitted by their preferred and strategic SCs to avoid any complacencies. The project manager also revealed that they presently had to critically evaluate SC invoices to ensure accuracy.

The project team were also concerned about the high tendency for SCs to go into administration during the project. They ensured that rigorous financial checks were undertaken before SCs were awarded their work package. The project team continued to engage with SCs to understand their financial position so that they could offer any necessary financial assistance through early payments or initiate recovery plans if it became eminent that a SC had to be declared bankrupt. The economic context thus influenced psychological expectations of the project team.

8.5.3 Payment Issues

Delta's payment practices were conducive for trust development as all the interviewed SCs acknowledged that the project team adhered to their 35 days payment arrangement. This was in accordance with their supply chain motivation and reward strategy as discussed in section 8.3.7. The commercial manager explained their underlying motivation for ensuring that every payment on the project had been 100% on time:

“We have paid every payment a 100 % on time if not 1 or 2 days early. We all understand his [SCs] biggest driver is his money and its cash flow in this economic climate – to us it’s a big driver to pay them on time and pay them correctly”

Thus in accordance with Delta’s SCM practice, the project team ensured that SCs were promptly paid. SCs expressed satisfaction with Delta’s payment practices as reflected in this statement by one of the SCs:

“Generally, [Delta] are very good payers, very good payers. On this scheme, it’s there on the button, the payments are there when they should be, there’s no issue at all with that” – **Quantity surveyor, Structural concrete SC**

The above statement reveals the high level of satisfaction that SCs expressed with regards to Delta’s payment practices, an indication of Delta’s trustworthiness. Another SC further explained that Delta were happy to exempt them from retention deductions because of their high confidence (trustfulness) that they would make good any defects. Regarding deducted retentions, SCs expressed the view that these were promptly repaid both after practical completion and after the defects liability period. These fair payment practices contributed to positive reinforcement of trust during the project.

8.5.4 Project Specific Context

The clients (council and waste management experts) influenced the SC selection process. The local council recommended that a number of SCs be used from the local area so as to promote local spending. Some other SCs were recommended to Delta by the waste management experts. Thus although the project team preferred to use familiar SCs, they had to sometimes go through a lengthy and rigorous process of finding and evaluating local unknown SCs. The project manager explained:

“...on this project, because our client is a local council, we’re going through a process of having to find local firms in this area so, people will get recommended to us and if they’re not on our database, it makes it a little bit longer to get them

through but we can get them onto the database and that means we can use local people. We haven't got a target but we're trying to get as many local companies as we can and we've done quite well so far.... But I suppose if it's a low risk package, you're not as worried about it but you still want to monitor it because even low risk stuff can be messed up."

The decision by the project team to use new SCs on low risk work packages as reflected in the above quotation demonstrates the relatively lower level of confidence (trustfulness) they had when SCs were unknown. Trust in such circumstances was also more cognitive than relational in nature given that any positive expectations (trustfulness) were underpinned by the knowledge acquired through the lengthy evaluation process. The cognition-based nature of trust here influenced the project team's approach to monitoring which is discussed in section 8.5.1.

The one-off nature of the waste transfer project also influenced the SCs that were selected from Delta's supply base. Delta had recently completed a similar waste transfer project and the project team ensured that majority of the selected SCs were specialists with whom they had successfully delivered the previous waste transfer project. This specialist and one-off nature of the project limited the amount of risk they could take on high risk work packages.

8.5.5 Perceived Opportunity for Future Work

Delta's SCM strategy provided a framework for promoting future work opportunities amongst their preferred and strategic supply chain SCs as discussed in section 8.3.4. The project team strived to ensure that this ambition was realised during the Delta project irrespective of the requirement to use local SCs:

"...the supply chain we've got here generally have been rewarded with continuity of work and for them, that's key, that's what is going to keep their cash coming in and keep their business alive. And we find we can get this sort of non-value added

things provided we give them a reward of you know, continuity of work” -

Commercial manager, Delta

These opportunities for future work were also acknowledged by SCs, who had already expressed expectations of securing future work as an important trust attribute (section 8.4.1). SCs had therefore become confident that Delta would always give them the opportunity as long as they performed satisfactorily. The demolition SC revealed that due to success on the Delta project, they had already secured another Delta project which was due to start in five weeks' time, reinforcing their confidence that they would always be rewarded for their performance. This high confidence in securing future work opportunities from Delta increased the trustfulness of SCs.

8.5.6 Job Performance

The project team were delighted with the high level of performance that had been demonstrated by all SCs on the Delta project. Their ultimate desire was for SCs - either regular or new - to provide a high quality of service and comply with the works programme. This reflects the emphasis Delta's personnel placed on competence as an important trust attribute (see section 8.4.1). SCs were also aware that beyond all other matters, performing to the highest standards on Delta's projects was the most important factor for cultivating trust. One SC explained how they sought to demonstrate their high competence by constantly speaking with the project team and keeping them informed:

“I think [how trust emerges] it's the team and talking to the team and keeping them informed I think is crucial. If we keep them informed, we're doing this today, we're doing that tomorrow, we're doing that next week, then they can plan and they can see and if those things happen in the right sequences and in the right timing, then they start to build up their trust and their confidence that you know what you're doing - **Project coordinator, Demolition SC**

The above quote reveals that keeping the project team constantly informed about work plans and the subsequent accomplishment of such helped to demonstrate their competence (trustworthiness) as well as build the project team's confidence (trustfulness) that the SCs were competent. These informal non-contractual updates were thus a strategy that SCs adopted to increase the project team's awareness about their ability to constantly perform during the project.

In summary, Delta's fair change management procedures, fair and timely payment practices, nature of the project, job performance of SCs and SC perceptions about future work opportunities were factors that influenced trust development during the Delta project. These factors were mostly linked to Delta's supply chain motivation and reward strategy (section 8.3.8) and their commitment to rewarding strategic and preferred SCs with continuity of work (section 8.3.4).

8.5 FUNCTIONAL CONSEQUENCES OF TRUST

The behavioural consequences of trust that were revealed during the Delta project are discussed as: 1) effective knowledge sharing; 2) self-organising behaviour; 3) relational flexibility; and 4) extra commitment. These behavioural consequences (summarised in Table 8.7) also had implications for satisfactory achievement of H&S performance, programme compliance, cost performance, and quality of workmanship.

Table 8.7: Functional consequences of trust in Delta's supply chain

Behavioural consequences	Delta	Subcontractors
Self-organising behaviour	<ul style="list-style-type: none"> • Only one works foreman for the £13 million project. • SCs mainly required to manage their works due to its specialist nature. • SCs both regular and new displayed high competence that 	<ul style="list-style-type: none"> • Were all keen to demonstrate high performance • SCs were self-organised when trust was cognition, system and relational-based. • H&S and quality were a particular focus so as to meet high expectations of project team.

Behavioural consequences	Delta	Subcontractors
	<p><i>was consistent with initial expectations.</i></p> <ul style="list-style-type: none"> • <i>More spot checks undertaken when SCs were unknown.</i> • <i>SCs were self-organised when trust was cognition, system and relational-based.</i> • <i>High competence was with regards to H&S and quality performance.</i> 	
Effective knowledge sharing	<ul style="list-style-type: none"> • <i>Regular and new SCs made inputs to improve cost, quality and make time savings.</i> • <i>Satisfaction with value engineering inputs of regular and new SCs.</i> 	<ul style="list-style-type: none"> • <i>Keenness to share any knowledge or make value engineering inputs that improve project outcomes.</i> • <i>Regular and new SCs made inputs to improve cost, quality and make time savings.</i> • <i>Contributing specialist D&B knowledge to the project although design element was not their responsibility.</i> • <i>Key driver is the desire to maintain relationship with project team.</i>
Relational flexibility	<ul style="list-style-type: none"> • <i>More relaxed atmosphere due to informality when trust is relational</i> • <i>Informality and flexibility task-specific.</i> 	<ul style="list-style-type: none"> • <i>High expectations of fair and reasonable treatment in the presence of relational trust made relationship less formal and contractual.</i>
Extra commitment	<ul style="list-style-type: none"> • <i>Extra commitment to work opportunity for preferred and strategic SCs where trust had evolved from cognition to relational-based.</i> 	<ul style="list-style-type: none"> • <i>Tendering assistance to support work winning</i> • <i>Flexible pricing when project team is very familiar and trust is highly relational.</i>

8.5.1 Self-organising Behaviour

The project team revealed that for a project of £13 million, there was only one foreman supervising the works as the project manager was not usually involved with day-to-day site management. Yet all SCs were meeting the project team's high level of expectation despite this limited supervision. SCs demonstrated very good understanding of the project and specifications, making it unnecessary to constantly 'lean over their shoulders'. SCs were able to self-manage their work packages whilst the project team relied on their engineers for random 'spot checking'. The project manager claimed that most of the SCs were more competent in their tasks than their engineers, given the specialist nature of the works.

Regarding unfamiliar SCs, the confidence that emerged from the accreditation checks, evaluation of SC H&S, quality and environmental systems (cognitive-based trust) still promoted that environment where SCs were able to demonstrate their self-management competencies. The project team's monitoring under such circumstances was basically to affirm their confidence that unfamiliar but evaluated SCs were highly competent to manage their work successfully. The project manager remarked about new SCs on the project:

“We’ve had two operations we’ve done using new contractors...but they performed very well, they know their stuff and we’ve obviously monitored them but, they have performed very well and they’re both local. That’s what you need, somebody who knows their job inside out who can give you the confidence that they know their job inside out”

The project team's monitoring thus reinforced positive expectations regarding the self-management potential of unknown SCs. The same self-organising behaviour was demonstrated by preferred and strategic SCs where such confidence was system and relational based in nature. The monitoring and 'spot checking' was however more dispersed when trust was relationally derived. This was because the project team's confidence (trustfulness) was based on several years of repeated success (familiarity).

8.5.2 Effective Knowledge Sharing

SCs expressed a linkage between their expectations to secure future work from Delta and the extent to which they were prepared to share any knowledge that could improve the quality of the works, reduce time spent on tasks or save cost. This readiness of SCs to share knowledge towards the project was considered an approach to demonstrate job performance competencies and attract future work opportunities. The structural steel SC also explained how they had given as much information and contributed much of their specialist knowledge towards the structural steel package as a design and build (D&B) steel contractor. They tried to bring D&B elements into the project although they could not take full responsibility for

the design because it was not originally their scheme. These examples of value engineering inputs were not limited to only strategic and preferred SCs but also first-time SCs that aimed to build a supply chain relationship with Delta. Such inputs contributed to cost savings, higher quality workmanship and compliance with the programme, reflecting how positive psychological expectations translated into successful project outcomes.

8.5.3 Extra Commitment

SCs that had built relational-based trust with the project team demonstrated an extra form of commitment by going an additional mile beyond their contractual duties. The commercial manager explained how familiar SCs went over and beyond their obligations to help solve a problem with a large retaining wall on the Delta project:

“...We see this as our supply chain going above and beyond, they’re getting involved, trying to help us out and it certainly won’t benefit them whatsoever you know. We’ve had many suggestions and I think it’s because they do feel a part of this, you know, they feel a part of what we’re trying to achieve”

The commercial manager further explained that SCs with whom they had cultivated familiarity (relational-based trust) were willing to provide them with their best supervisors upon request. This was because such SCs had the highest level of expectation in securing future work opportunities from Delta. This was reflected in a statement by one of the SCs who revealed that the underlying motivation for being extra helpful to Delta was to gain future work opportunities:

“we’re doing that [being helpful to Delta] because, I suppose ultimately, we’re doing it because we think if we’re helpful it’ll gain us to perhaps get on the tender list for another project” - **Operations director, Structural steel SC**

Subcontractors that had benefited from repeat business opportunities and had developed considerable familiarity with Delta’s project teams expressed the highest positive

expectations that their efforts would be reciprocated through future work opportunities. Due to this high trustfulness, such SCs were also more committed to helping Delta with competitive tender prices especially when they were familiar with the team that were potentially going to manage the job. This was explained by the structural concrete SC:

“...it’s how we price the works and what view we take on when we price the works. If its people that we know and we’ve worked before, we know how they operate, what they expect, then we tailor our price to that...If we were pricing a job for someone we’d not worked with before, a project manager and a quantity surveyor, we’d probably be a bit more rigid in our prices”

Familiarity with a particular project team (relational-based trust) thus influenced the rigidity or flexibility of SC’s pricing, which had implications on cost performance of the project. The above statement also reveals that the demonstration of extra commitment was primarily an interpersonal phenomenon as specific mention was made of familiarity with the particular personnel managing the project rather than Delta as a corporate organisation.

8.5.4 Relational Flexibility

Delta’s project team acknowledged that relational-based trust which derived from familiarity with SCs influenced the degree of informality that manifested during the project. It was this informality that caused the project team to execute limited ‘spot checks’ when SCs were already familiar. Less time was also spent on the otherwise lengthy pre-start meetings and site inductions when trust was relational-based. This was because the project team were familiar with some of the supervisors. SCs who were very familiar with the project team also revealed that they were less contractual because of this relationally derived knowledge about the extent to which they would be treated fairly and reasonably by the project team. One such SC explained how over time, their relationship with the project team became very relaxed:

“When you go back before this job, especially two, three years ago, it was a different story, you did have to be more kind of careful about everything. I think that was probably down to the fact that we hadn’t worked with them for a long time” –

Quantity surveyor, General SC

Thus after a 2-3 year period of working together, some relational flexibility emerged with the project team, making them less formal and cautious in their approach during the project. Interestingly, this flexibility was task-specific. The project team were relaxed in their approach with the structural concrete SC when it came to structural concrete works, but approached the same SC with caution and extra vigilance when it came to drainage and groundworks, which they had only been awarded for the first time. The project manager made this remark with regards to the structural concrete SC:

“...we’ve given him the opportunity here to do the groundworks but it just means that we have to watch him a bit more on that, but he’s performed very well so far and I have no issues at all. That would go for the next round onto the database so that people would know now that he also does groundworks and drainage”

Thus, although the project team had very high trust (relational-based trust) in the structural concrete SC that consequently resulted in a relaxed, informal and less cautious approach during the project, their involvement with a new work package prompted more caution. This resulted in increased monitoring and supervision so as to confirm satisfactorily performance. Time was therefore required for such high confidence and relational flexibility to emerge with regards to the groundworks and drainage work package after repeated successes.

In summary, SCs on the Delta project demonstrated self-management capabilities, shared knowledge that was required for project success, displayed extra commitment and were flexible with the project team. This was because of the presence of trust across the three dimensions i.e. cognition, system and relational-based, that emerged from Delta’s SCM

arrangements, particularly their ambition to constantly reward high performing SCs with future work opportunities.

8.6 SUMMARY

Delta's SCM practices have been discussed as comprising: supply chain orientation, supply chain assessments, supply base management, performance scoring, CPI activities, long-term relationships and supply chain motivation & reward. Although there was a perceived vagueness about their categorization status amongst SCs, Delta's ambition to promote long-term supply chain relationships amongst their preferred and strategic SCs, commitment to prompt and fair payments with an option for early payments, biannual supply chain review meetings were all SCM practices that helped to cultivate trust with their supply chain. These practices prompted positive trust expectations that were revealed from both Delta and SC perspectives as well as contributed to the realisation of trust across three dimensions: cognition, systems and relational-based. Delta's SCM practices also provided the platform for factors such as payment issues, perceived opportunity for future work and job performance to contribute to trust development.

The functional consequences of trust have also been discussed as: effective knowledge sharing, self-organising behaviour, relational flexibility and extra commitment. These behaviours were linked to the presence of trust across the three dimensions and particularly the extent to which SCs were trustful of securing future work from Delta. Relational flexibility and demonstration of extra commitment were exclusively linked with relational-based trust in particular. It has therefore been revealed from these findings how Delta's SCM practices provide a framework for trust development and consequently stimulation of behaviours that translate into achievement of satisfactory project objectives.

Having discussed findings of the four case studies, the next chapter (Chapter Nine) presents a cross-case comparison of these findings so as to enable the drawing of firmer conclusions about the influence of strategic SCM practices adopted by UK MCs on inter-organisational trust development during projects.

CHAPTER NINE: CROSS-CASE ANALYSIS AND DISCUSSION OF FINDINGS

9.1 INTRODUCTION

Findings from individual case studies have been presented in Chapters Five, Six, Seven and Eight. This chapter presents a cross-case analysis identifying similarities and differences in SCM practices and any implications that such had on trust development and its functional consequences. The chapter is thus structured into four main sections. The first section provides a comparison of case study contexts. This is followed by a cross-case comparison of SCM practices and trust manifestation in the MC's supply chain. The fourth section presents a cross-case comparison of the functional consequences of trust in the MC's supply chain. Findings are also discussed in each section by drawing upon relevant SCM and inter-organisational trust literature. For the sake of brevity, extracts of interviews are not included in this chapter as have been done in individual case study chapters. This chapter contributes towards the achievement of research objective four.

9.2 BACKGROUND OF CASE STUDIES

A cross-case comparison of case study backgrounds comprising background of the companies, description of case study projects and research participants is required to ensure that cross-case findings are interpreted within context.

9.2.1 Backgrounds of Companies

The four case-study organisations were UK MCs that had branch offices across the country. The backgrounds of all four case study companies are summarised in Table 9.1. Delta employed the highest number of personnel globally and had the highest annual turnover of

£2.3b. Beta was the smallest of all the four companies based on number of employees and annual turnover, although they had been taken over by a larger UK construction group.

Table 9.1: Cross-case comparison of case study organisations

	Alpha	Beta	Gamma	Delta
Annual turnover	£ 1.8 b	£ 800 m	£ 3.5b	£ 2.3b
Number of employees	28,000	2,300	17, 352	50,000
Year of establishment	1874	1908	1978	1930
Data collection branch	West Midlands	West Midlands	Manchester	West Midlands

All four companies were ranked in the top 10 of UK construction firms by annual turnover (albeit this is when considering Beta a part of their parent company). All four companies had implemented SCM as a strategy for managing their SCs. Apart from the Gamma case that involved the Manchester office; branches of the other companies that participated in the research were located in the West Midlands Region of UK.

9.2.2 Description of Case Study Projects

The Beta and Gamma projects involved the construction of schools in West Midlands and Greater Manchester respectively. The Alpha project was an office construction located in East Midlands and the Delta project was an infrastructure project that involved the construction of a waste recovery centre in the West-Midlands. Apart from the Gamma school project which was a new build, all others involved a mixture of new build and refurbishment works. However, the new build Gamma project also entailed demolition of an existing school after the new school was complete. All the projects involved public sector clients, with the Gamma and Delta projects also having private sector client involvement. The projects were all programmed to run for more than one year with the Gamma project

having the longest duration of 25 months. When data collection began, the projects were at a stage where project delivery teams had worked together for considerable periods with the Delta project being the least advanced in terms of percentage of work completed i.e. 35%. Profiles of the four projects have been summarized in Table 9.2.

Table 9.2: Cross-case comparison of project characteristics

Project features	Alpha	Beta	Gamma	Delta
Nature of project	Offices	School	School	Waste recovery centre
Location of project	East-Midlands	West-Midlands	Greater Manchester	West-Midlands
Nature of works	Refurbishment + new works	80% new works and 20% refurbishment	New build + Demolition	80% new works and 20% refurbishment
Type of client	Public client	Public client	Public and private client	Private and public
Selection mode	Competitive tender	Negotiation	Competitive tender	Negotiation
Proposed duration	17 months	13 months	25 months	17 months
Current stage of project	55% complete	65% complete	65% complete	35% complete
Procurement arrangement	Design and build	Framework agreement	PFI	Design and build
Contract form	NEC3	NEC 3	Bespoke PFI	JCT contracts with amendments
Contract sum	£ 30.5 million	£ 1.8 million	£21 million	£ 13 million
Subcontract packages	29	30	33	50

The Beta and Delta projects were won through negotiated tenders whilst selection on the Alpha and Gamma projects were through competitive tendering. The Alpha and Delta projects were D&B contracts, with the Alpha project starting off on site at a time when designs were still incomplete. The Gamma project was being delivered through a PFI arrangement where Gamma was part of a special purpose vehicle (SPV) known as the local education partnership (LEP).

9.2.3 Background of Research Participants

Across the four cases, 39 semi-structured interviews were undertaken, 17 of which were with personnel from the MC organisations. Five (5) of these personnel were managers at the head office of each MC that were responsible for setting the SCM strategy whilst the other 12 constituted the MC's project delivery team (construction managers, site managers and quantity surveyors). Additionally, 22 SC personnel that were directly involved with managing their work package were interviewed. Only one female who was a quantity surveyor for a SC on the Alpha project participated in the study, perhaps reflecting the long running issue of gender inequality and female underrepresentation in the construction sector (see Amaratunga *et al.*, 2006; Sang and Powell, 2012; Worrall, 2012). All interviewed personnel were aged above 30 years with trade qualifications, university degrees as well as recognised construction industry professional affiliations. They also had considerable experience in the construction industry with the minimum being between 4-6 years. They were thus in good positions to provide vivid accounts about how MC's SCM practices influenced inter-organisational trust development during projects.

9.3 SUPPLY CHAIN MANAGEMENT PRACTICES OF MAIN CONTRACTORS

A cross-case comparison of the eight themes that emerged from the analysis of MC SCM practices are summarized in Table 1 of Appendix C3 below. These discussions below aim to highlight similarities and differences in such practices as well as contrast these with previous SCM literature.

9.3.1 Supply Chain Orientation

All four MCs implemented SCM due to similar motivations of ultimately developing closer collaborative relationships with SCs through repeat business. However whereas Alpha, Beta and Delta subcontracted between 70-90% of their workload annually, Gamma had a

different approach to subcontracting. They self-delivered a majority of work packages and only subcontracted approximately 30% of their annual workload. This was due to their transition towards an engineering enterprise where most building components would be off-site manufactured and assembled.

Thus Gamma's SCM process was oriented towards the achievement of the design for manufacture and assembly (DFMA) agenda. Alpha, Gamma and Delta had designated personnel that coordinated their SCM functions whereas Beta made this an additional responsibility of the commercial team, having scrapped the supply chain manager position during a staff reduction exercise. Across the four cases, there was however that acknowledgement by senior management that strategic and systematic management of downstream suppliers and SCs was required as suggested by Mentzer *et al.* (2001). Except for Beta's less structured approach, the other three MCs had instituted formal structures and designated personnel that could coordinate interactions with SCs.

9.3.2 Supply Base Management

Alpha, Gamma and Delta had a relatively larger sized supply base that comprised 5000, 2500 and 10,000 SCs respectively compared to Beta's regionalized supply base of approximately 150 SCs. Gamma's supply base was relatively smaller to that of Alpha and Delta when considered in relation to their annual turnover (see Table 9.1). This was because Gamma had streamlined their supply base to fit fewer firms that contributed to their DFMA agenda. Similar to supply base management principles revealed by Ronchi (2006), all four MCs had classified their supply base into different categorizations. Alpha, Beta and Gamma operated a four level categorization structure whereas Delta's supply base was classified into just three levels. All four MCs however emphasised the flexible nature of their categorization structure based on performance despite Gamma's categorization being

relatively more fluid and flexible. This flexibility of the supply base is consistent with suggestions by Wisner *et al.* (2011) that firms should continuously restructure their supply base by demoting poor performers whilst optimizing its size to achieve greater levels of supply performance.

All four MCs gave priority to SCs based on their ordering on the supply base, with those occupying the highest level getting the most benefits. It was only in the case of Alpha that SCs were mostly aware of their present status on the supply base. The other three MCs did not explicitly update SCs about their current status after initial registration onto the database. A SC on the Beta project was of the view that the SCM process had faltered significantly whereas another on the Delta project did not know if they were officially on or off the supply base although they still attracted considerable work from Delta.

Alpha established close connectedness with their supply base through allocation of contact persons to SCs although the degree of contact with SC personnel and consequently connectedness decreased further down the categorization levels. A high level of connectedness was revealed between Gamma and their supply chain which was perhaps due to their use of fewer SCs given their approach to subcontracting (30% work subcontracted). Gamma also had formal supply chain agreements with SCs in their three main levels, unlike Alpha where formalized agreements were established with only their highest tiered SCs (category one). For Beta and Delta, supply chain relationships remained mostly informal throughout the different categories.

9.3.3 Supply Chain Assessment

All SCs undertook similar assessments through supply chain interviews, administration of standard questionnaires, obtaining necessary references and undertaking checks with third

party organisations e.g. Dun and Bradstreet (D&B) financial assessments, safety scheme in procurement (SSIP) checks, company registration checks, insurance checks and verification of membership status with industry recognised trade federations. Such assessments or audits were mostly initiated during supply chain open days (meet-the-buyer days) although Delta was now transitioning to more direct B2B interviews with potential SCs. Instances were cited on the Alpha and Gamma case where SC office visits were undertaken to confirm the accuracy of information provided in the SC questionnaire or during interviews. This only became possible because they had dedicated teams allocated to their SCM functions – unlike Beta. This SCM feature was basically used to gauge the trustworthiness of SCs before they were given a job and subsequently admitted onto the supply base. This reflects the process of trustworthiness estimation described in previous research (Colquitt *et al.*, 2007; Tullberg, 2008; Manu *et al.*, 2013a).

9.3.4 Long-term Relationships

Alpha, Beta and Delta's approach to the promotion of long-term relationships were somewhat similar as about half of their subcontract orders were placed with their highest tiered SCs annually. Gamma on the contrary developed long-term relationships with 99% of SCs in their three main categorization levels. This was because of their ambition to engage with fewer SCs (30% of subcontracted work) that fit within their DFMA agenda. This could also have accounted for the fluid and flexible nature of supply chain relationships across Gamma's three main supply chain categories. Across the four cases, long-term supply chain relationships were established with SCs that made strategic contributions to the MCs business either through exceptional performance or support for in-house agenda such as in the case of Gamma. As posited by proponents of the resource dependence theory (RDT) (see: Pfeffer and Salancik, 1978; Hillman *et al.*, 2009), these long-term supply chain

arrangements were perhaps to reduce any power imbalances and manage mutual dependencies when the MCs realised the need to depend on some SCs for critical services.

9.3.5 Supply Chain Performance

All the MCs undertook similar supply chain performance scoring on H&S, standard of work, contractual and financial cooperation and general SC helpfulness through the use of a standardized questionnaire. Gamma's scoring system was designed to identify only low and high performers as they were not particular about middle scores. The performance measures revealed across the four cases are reflective of the financial, customer and internal business perspectives of the balance scorecard (BSC) approach (Kaplan and Norton, 1992) as against the learning and growth perspective enshrined in the UK Government's 2025 vision for the construction sector (BIS, 2013a).

Across Beta, Gamma and Delta, performance scores were not actively disclosed to SCs except for when performance was so poor during the project that a SC had to be invited for improvement discussions, particularly on H&S and workmanship quality. Alpha however disclosed performance scores to SCs in their highest category. These disclosures were made during formalized annual supply chain review meetings that were restricted to SCs on their highest category. These top category SCs also had the exclusive opportunity to reverse score Alpha's project team. Beta and Delta also claimed to provide opportunity for all SCs to reverse score their project team whereas Gamma did not give any such opportunity at all. The interviewed SCs nonetheless expressed misgivings about openly rating performance of project teams that had selected them for a project. Perhaps anonymous web-based reverse scoring could yield more constructive feedbacks from SCs, although there is the tendency for such anonymity to provide opportunity for mischief.

9.3.6 Supply Chain IT System

Alpha and Delta had developed a bespoke IT system that centrally held SC information obtained during supply chain assessments, spending levels, key contact personnel, performance scores and details of current workloads. Beta's IT system was however a basic spread sheet database whereas Gamma's proprietary IT system intended to perform similar functions as that of Alpha and Delta was adjudged by the project team to be non-functional and non-user friendly. This was due to the inability to generate any intelligence from the system during SC selection. Alpha's IT system was the most functional in this sense and met all the requirements of an effective information system as outlined in Gattorna and Walters (1996) given that queries could be run according to trade, location, annual spend, performance scores and supply chain category. The functionality of Alpha's IT system provided intelligence that supported both top management and operational (site-based) decision-making as recommended by Hugos (2011). It was also important to notice that information obtained from the supply chain IT system only augmented site based decision making rather than transferring such responsibilities to the top management at the head office.

9.3.7 Continuous Performance Improvements

All four MCs engaged their SCs in continuous performance improvement (CPI) activities using different strategies. Alpha had formalized annual review meetings – through allocated contact persons - with only their highest category SCs where they discussed performance, future workloads and improvements areas. Delta also allocated key contacts to SCs that met at least twice a year to discuss improvement areas. Gamma organised workshops, innovation days and visits to their manufacturing facility all in a bid to promote their DFMA agenda amongst their supply chain. Regarding Beta, there were no such formalized annual meetings except that recognised SCs were required to undergo an in-house H&S training and

certification that exempted them from lengthy site inductions. SCs were however not allocated contact persons as in the case of Alpha and Delta. This inhibited the level of connectedness within Beta's relatively small regional supply base. The most noticeable similarity amongst all the MCs was how CPI engagements were targeted at those SCs that had more potential to attract future work. H&S also featured prominently in CPI efforts across all four cases which goes to indicate the recognition and extent of effort by MCs to minimize adverse H&S consequences of subcontracting (Ankrah, 2007; Manu *et al.*, 2010b; Manu *et al.*, 2013b).

9.3.8 Supply Chain Motivation and Reward

All four MCs employed different supply chain motivation and reward strategies. Alpha and Beta had supply chain awards for their best performing SCs whereas Delta was of the view that continuity of work was the most important motivation to SCs. Delta also assisted a SC to expand and grow their business in a new area through advice and work opportunity. Alpha also used the supply chain status to motivate SCs as they were all striving to progress to the highest category so as to get exclusive benefits such as the opportunity to price for all upcoming jobs. Alpha, Gamma and Delta also used CPI engagements to discuss pipelines of future work. SCs expressed their views on how such discussions about future work served as motivation.

The four MCs also claimed to motivate and reward SCs through fair payment practices knowing very well that cash flow was the biggest problem for smaller firms. Alpha, Beta and Delta had similar payment arrangements of 30-35 days whereas Gamma's arrangement was 45 days. Beta however acknowledged that their 35 days arrangement was met 80% of the time, Delta claimed 95% adherence and Gamma 100% adherence. It was however only

Delta that extended additional payment assistance to SCs through dynamic discounting (early payment for a discount).

9.3.9 Discussion of Strategic SCM practices

The underlying rationale for employing SCM with strategic intent was to prioritize the 20% of SCs that attracted 80% of annual spending as these were the SCs that could be depended upon to leverage long-term value. To achieve this, MCs identified and engaged with such SCs through their various initiatives. For example, Gamma's supply chain strategy was carefully aligned towards the promotion of their various initiatives, especially the design for manufacture and assembly (DFMA) agenda. The nature of SCs that were on their supply base, the supply chain assessments, the long-term relationships and CPI activities were all closely aligned to the promotion of the DFMA agenda.

This also illustrates how SCM can become an instrumental platform for promoting other construction industry initiatives such as BIM and sustainability which have become the most vibrant forces impacting construction project delivery (see Cassidy, 2003; Barlish and Sullivan, 2012; Kibert, 2012; Succar *et al.*, 2012) as well as other in-house business objectives. In a rapidly increasing digital and green, low-carbon economy (see BIS, 2013a), promoting both the BIM and sustainability agendas through strategic SCM could be fundamental to the long-term competitiveness of construction supply chains. This can be achieved by carefully aligning SCM features such as supply chain assessments, performance scoring, CPI activities and even supply chain motivation and reward mechanisms towards such agenda, enabling construction supply chains gain competitive advantage as single units working towards a common direction.

In relation to the five-staged SCM maturity model developed by Lockamy III and McCormack (2004) (see section 2.5.2), MC SCM practices as revealed from these findings can be mapped onto the linked maturity stage - described as a break through level. The above findings have revealed that MCs in this study employed SCM with strategic intent and had established jobs and structures outside traditional functions that focused on coordinating SCM activities. Process performance measures and CPI activities were also in place as stipulated for the linked maturity level (Lockamy III and McCormack, 2004). Considerable efforts are however still required to ensure that SCM measures and management systems become fully entrenched to an extent that collaborative planning and forecasting with customers and SCs becomes the norm.

There is also scope for a collaborative culture where performance and reliability could be focused on the extended supply chain, joint investments made towards system improvements and returns equitably shared. Progression on the current trajectory could make MC SCM practices map favourably to the integrated and extended stages of Lockamy III and McCormack's SCM maturity model. Seamless interactions at the extended level of maturity for instance (see section 2.5.2) could also provide a supply chain environment that is most ideal for realising BIM level 3 visions (integrated cloud working) as stipulated in the UK Government's BIM implementation strategy (see BIS, 2011; BIS, 2012).

9.4 MANIFESTATION OF TRUST IN THE SUPPLY CHAIN

To understand how trust manifested across the four case studies, a cross-case comparison of trust attributes from both MC and SC perspectives, nature of trust that manifested and factors that influenced trust development in the supply chain during the projects are discussed.

9.4.1 Cross-case Comparison of Trust Attributes in the Supply Chain

All the MC personnel expressed *reliance for help*, *competence* and *familiarity* as trust attributes they considered important with regards to SCs as can be seen from Table 3 of Appendix C3. They expected to rely on SCs for help through value engineering advice, tendering assistance and technical problem solving assistance during the project. Gamma's personnel in addition emphasised expectations they had for SCs to help them realize their DFMA agenda. Some MC personnel across the four projects also expressed *openness*, *reputation* and *honesty and integrity* as desirable trust attributes (see Table 3 of Appendix C3). Similarly, SCs across the four projects expressed *familiarity*, *competence*, *reliance for help*, *openness*, *reputation* and *honesty and integrity* as desirable trust attributes (see Table 4 of Appendix C3). Reliance for help from SC perspectives was however in relation to getting regular jobs from MCs whereas *honesty and integrity* was primarily about expectations of getting paid without any hidden costs or charges.

The major difference in expectations expressed by SCs was that of *fair and reasonable treatment* as this was not mentioned by any MC personnel except for an acknowledgement that this was a fundamental SC expectation. The *fair and reasonable treatment* attribute was also similar to that of openness, which was an expectation of SCs about the desire to work in an environment that fostered honest discussions when problems arose during the project. These SC expectations reflect the likelihood of unfair treatment from MCs (Arditi and Chotibhongs, 2005; Yik *et al.*, 2006; Hurley, 2012) and the power dynamics in supply chain relationships especially when SCs have become highly reliant on a MC for jobs (Yik *et al.*, 2006).

The trust expectations revealed by both MC and SC personnel are consistent with the three attributes identified earlier in the literature: competence, integrity and benevolence (see

Shaw, 1997; Mayer *et al.*, 2007). The ‘reliance for help’ attribute can particularly be likened to benevolence trust or demonstration of concern as put by Shaw (1997). This is a form of goodwill that was expected to be reciprocated at a later time. Trust expectations from both parties were also connected to some of the MC’s SCM practices. The familiarity attribute was linked with the extent to which long-term supply chain relationships had been fostered and how both parties had gained considerable knowledge about each other through previous interactions. Competence and reputation were linked to the supply chain assessment process and the supply chain performance scoring processes once engagement began on the project. Also, ‘fair and reasonable treatment’ and ‘honesty and integrity’ were attributes that related to the MC’s payment practices – linked to the supply chain motivation and reward aspect of their SCM practice.

The findings also reveal how SC perceptions of corporate reputation translated into positive expectations directed at MCs. Bachmann and Inkpen (2011) argued in their conceptual study that an organisation can have formal or informal behavioural norms that influence the degree of attraction potential business partners have for affiliating with them. SCs ascribed positive expectations to MCs that were perceived as very large and financially stable (see Table 4 of Appendix C3). This to them increased the likelihood of getting paid without any bankruptcy problems. Generally, the attributes of trust expressed by both parties oriented towards expectations that related to their individual business interests.

9.4.2 Cross-case Comparison of Nature of Trust in the Supply Chain

Three dimensions of trust: cognition, system and relational based trust manifested across the four case study projects in different ways. These are discussed in this section.

9.4.2.1 Cognition-based Trust

Cognition-based trust emerged from information that the project team acquired during supply chain assessments or audits, pre-order, pre-start interviews and interactions during the works. Patterns were revealed across the four cases to show that cognition-based trust derived from the supply chain assessment feature of SCM practices (see Table 2d of Appendix C2). The use of third party organisations for financial checks and pre-qualification also explain why researchers like Shapiro (1987) and Coleman (1994) have claimed that third party guarantors' play an essential role in trust development. On project Alpha, the project team undertook rigorous audits when a SC had never been used. The project team in one instance had to visit another project to make further inquiries about a SC's performance. Similar audits were undertaken by Beta, Gamma and Delta for first time SCs except that Beta's audits were adjudged by their project team to be less rigorous because there was no team fully dedicated to this function. All four MCs also sought further information from SCs during pre-order and pre-start interviews, based on which the project team had to make interpretations about what they could expect during the project.

This cognition-based dimension of trust was sometimes referred to as a gut-feeling about people that were previously unknown. The senior site manager on the Beta project narrated how his experiential knowledge helped him differentiate between highly competent and less competent work gangs just from the manner in which they turned up on site for the first time. The project manager on the Gamma project also narrated how information had to be sought from other colleague project managers that had recently worked with a particular SC. This however reflected Gamma's inability to gain such intelligence from their supply chain IT system. For Alpha and Delta, once a SC had worked with the company in the past, performance scores, peculiar strengths and weaknesses could be accessed from their supply chain IT system. This dimension of trust therefore thrived on information and knowledge

that was obtained through the supply chain assessment process, first time impressions, performance information held on the supply chain IT system and the experiential knowledge of the project team based on which they reflexively adjusted their psychological expectations.

These findings support previous claims that cognition-based trust is rational and knowledge driven (see Johnson and Grayson, 2005; Kadefors and Laan, 2007; Wong *et al.*, 2008). It was also more calculative in nature and reflects suggestions by Lewicki and Bunker (1996) that potential trustors tend to adopt relatively more calculative approaches to trust during initial stages of relationships.

9.4.2.2 System-based Trust

Across the four case studies, system-based trust was revealed as a form of confidence that emerged from the existence of a shared knowledge of working procedures, standards and policies. Positive expectation for instance emerged from the realization that SC supervisors had met certain training requirements especially on H&S. The 2-4 day training courses on Gamma's H&S culture alongside workshops on their DFMA strategy, the in-house H&S training and certification scheme offered by Beta and the supervisor H&S training offered by Alpha and Delta were all practices that contributed to the emergence of systems-based trust. The continuous performance improvement (CPI) activities were thus a route through which system-based trust emerged. System-based trust also emerged from the project team's recognition that a SC had worked with their organisation in the past although with a different project team. It was about the existence of factors that provided the project team with confidence that SCs would work congruently in accordance with their working practices. Alpha for instance had to implement additional processes i.e. principal meetings and

financial meetings just to have that positive confidence that a claim conscious M&E SC would meet their expectations without the repeat of a previous claims dispute.

Studies have previously emphasised the relevance of institutional structures that can reduce the risk of misplaced trust, particularly the use of formal contracts (Arrighetti *et al.*, 1997; Poppo and Zenger, 2002; Woolthuis *et al.*, 2005). Institutional trust has also been said to emerge from a variety of sources: legal regulations, professional codes of conduct that may or may not be legally binding, corporate reputation, standards of employment contracts, and other formal and informal norms of behaviour (Bachmann and Inkpen, 2011). Wong *et al.* (2008) also posited that contracts and agreements were a source of systems-based trust in construction. However, findings from this study reveals that more emphasis was placed on meetings, training and certification programmes – all of which contributed to a shared knowledge of working practices – as against the subcontract agreements. No mention was made of the emergence of confidence (system-based trust) from contractual agreements that had been signed by both parties. The emergence of systems-based trust through contractual agreements could therefore be a pronounced phenomenon at the client and MC level.

9.4.2.3 Relational-based Trust

Relational-based trust was revealed in instances where there was already familiarity between SCs and the project team. This aspect of trust thrived on interpersonal relationships that had built up through repeated interactions both at project and head office levels. Relational-based trust was much more pronounced amongst Alpha's top category SCs due to higher levels of job exposure and formalized annual review meetings. Regarding Gamma, relational-based trust was revealed amongst SCs in their three main supply chain categorization levels. One factor for this might be the high level of connectedness Gamma established with all SCs on their supply base through formalized supply chain agreements

and regular exposure to jobs. It could also have been due to the project profile as all the interviewed SCs had previously worked with the project team on other BSF projects.

On the Beta project, trust was relatively less relational in nature despite the supply base being much smaller. Due to the very large size of Delta and their numerous project teams across different divisions for instance, SCs claimed that relational-based trust was restricted to project teams they were familiar with. SCs narrated how it had sometimes seemed they were working with Delta for the very first time when they engaged with their other unfamiliar project teams. This dimension of trust thus depicts the interaction-based trust that Bachmann and Inkpen (2011) claimed to develop on the basis of repeated face-to-face experience between two or more individuals.

Due to the time dependent and interactional nature of relational-based trust, the object to which it was directed varied based on the length of time parties had engaged with each other. SCs that had worked with the MC for considerably long periods had built interpersonal ties with different project teams and head office personnel. Consistent with the operational and strategic-level trust identified by Janowicz and Noorderhaven (2006), there was a certain time threshold when the object to which trust was directed transitioned beyond operational-level personnel (project team) to incorporate relationships with those at the strategic-level (head office personnel). This highlights the influence of interpersonal relationships on inter-organisational trust development.

9.4.2.4 Discussion on the Nature of Trust

Claims have been made in previous research that relational-based trust is strongest, with system-based trust being semi-strong and cognition-based trust being the weakest trust dimension (Murphy, 2006; Kadefors and Laan, 2007). Patterns were found in support of

such claims as the existence of relational-based trust coincided with the achievement of almost all trust expectations i.e. competence, familiarity, openness, reliance for help, fair and reasonable treatment and honesty and integrity as expressed by MC and SC personnel (see Table 2c of Appendix C2). Cognition-based trust was however mainly associated with expectations of competence and integrity.

Cognition-based trust here reflected micro-level psychological perspectives whereas system-based trust reflected both micro-level sociological and macro-level institutional aspects of trust as proposed by Rousseau *et al.* (1998). Since cognition and systems-based dimensions of trust did not necessarily require prior interpersonal relationships, they could be said to constitute the institution-based trust described by Bachmann and Inkpen (2011). Relational-based trust however reflected the meso nature of trust (Rousseau *et al.*, 1998) as micro-level psychological and sociological processes were fully integrated with macro-level institutional arrangements.

The influences of interpersonal interactions were evident across the three trust dimensions. However, unlike with relational-based trust where such interpersonal interactions had been cultivated over long periods through repeated interactions, cognition-based trust was influenced by first impressions or gut-feelings during initial meetings. This has implications for how boundary-spanning representatives of SCs present themselves to project teams during first time meetings. This influence of interpersonal interactions provides empirical support for previous arguments about inter-organisational trust being somewhat a derivative of interpersonal trust (see Zaheer *et al.*, 1998; Lau and Rowlinson, 2009). The SCM practices of all the four MCs provided that platform for both interpersonal and institutional trust generative mechanisms to thrive as evidenced by patterns revealed in matrix coding query results of SCM practices and the three trust dimensions presented in Table 2d of

Appendix C2. Strategic SCM practices of the MCs thus provided an institutional framework for trust to manifest across the three trust dimensions i.e. cognition, system and relational dimensions.

9.4.2 Factors that Influenced Trust Development in the Supply Chain

Similar factors (summarised in Table 4 and 6 of Appendix C3) were revealed by MCs and SCs across the four cases as influential to trust development during the projects. The influence of changes to work scope was highlighted by both parties as a source of disagreement that could easily escalate into disputes and hence degrade trust. Particular trades such as scaffolding were revealed to be more prone to variations in work scope during project Alpha. Such changes had to be carefully managed by Alpha's project team as designs were not complete before work began on site. Regarding Beta's project, poor design detailing resulted in change related disagreements where the project team felt some SCs over claimed for extra work.

On the Delta project, accurate record keeping on the demolition waste taken away from the site was used to avoid any disagreements on the demolitions work package. Though expressed as a tedious accounting exercise, this proactive record keeping approach influenced Delta's trustfulness whilst the demolition SC used this opportunity to demonstrate their trustworthiness. According to the demolition SC, the project team's honesty (trustworthiness) was also demonstrated on numerous occasions when their attention was surprisingly drawn to underestimations in the number of truck loads transported off-site, having checked this against their own records. To them, this signalled that Delta's personnel were genuinely interested in compensating them for the exact amount of work done.

There were no change related disagreements on the Gamma project with SCs reiterating a high level of confidence (trustfulness) in Gamma's change management process because of the usually minimal difference in entry and exit price of work packages, said to be between 5-10% of the original contract price. SCs were of the view that Gamma were generally very clinical in winning jobs at the right price, thus avoiding any need to place financial strain on their SCs. Gamma's good contract management practices therefore translated into high SC trustfulness although this could also have been influenced by the fact that Gamma self-delivered the high risk and high variable work packages or because the project involved prefabricated components. These findings reveal how the change management process can have enormous influence on the trustworthiness and trustfulness of both MCs and SCs during the project.

Payment issues, perceived opportunity for future work, job performance, project specific context and economic climate (see Table 3b of Appendix C2) were the other factors that influenced trust across the three dimensions. Delays in release of retention sums at the end of the defects liability period were particularly highlighted by SCs on projects Alpha, Beta and Gamma as a payment issue (see Table 6 of Appendix C3). These payment problems are to be expected in an environment that is pervaded by late payments, award of contracts based on cheapest price as against best value, demand for retrospective discounts and cash rebates (Hurley, 2012).

A SC on project Delta however indicated high trust in regards to Delta's payments practices, especially having been exempted from retention deductions on the project. Though the issue of late payments has been a persistent problem in the UK construction sector (Hurley, 2012; Vinden, 2013), commitments to fair payment and retention arrangements should be entrenched in the supply chain motivation and reward feature of the MC's SCM practice.

Much is however still desired as some of the MCs acknowledged their inability to sometimes meet their mutually agree fair 'account payable' arrangements of between 30-35 days. Such efforts would also be consistent with consultations on the use of a construction supply chain payment charter to promote a responsible payment culture in the UK (see CIOB, 2014; Fitzpatrick, 2014; Nichol, 2014).

Nichol (2014) has proposed that companies that fail to comply with the supply chain payment charter be made ineligible for public sector projects. Clearly, there is the scope for MCs to use the supply chain motivation and reward aspect of their SCM practices to embed and promote terms stipulated in such a charter; ultimately providing the necessary impetus for achieving a timely and fair payment culture across the construction supply chain.

Regarding the influence of economic climate, SCs were of the view that a downturn in the economic environment increased the tendency for project teams to select unknown SCs from outside of their supply chain base so as to meet stringent budget requirements. Their view was that an austere environment increased commercial focus during projects whilst minimizing the relevance of relational-based trust that had accrued in the past. This also added a financial aspect to trust as the project team sometimes felt that regular SCs could become complacent and hence provide them with uncompetitive price estimates. They thus resorted to the market testing of prices obtained from their supply chain to ensure that these were reliable and competitive. This reinforces claims that the 2008 'credit crunch' ushered in an austerity period where cost drivers and price cuts become dominant amongst most construction industry players, inhibiting collaborative efforts (Kumaraswamy *et al.*, 2010; Smyth, 2011).

Project specific circumstances also influenced the trust development process as this dictated some MC decisions. Alpha and Delta for instance narrated instances where SCs from outside of their supply chain base were selected to promote localism as per requests by the public sector clients to their projects. Budget flexibility also influenced the commercial emphasis placed on different work packages during the project. Alpha's personnel explained that winning the job on a tighter margin made them particular about meeting stringent budget requirements for each work package. This was sometimes linked back to clients wanting to undertake their projects at the least cost.

Job performance was also a trust influencing factor that both parties expressed not only in relation to technical competence, but also commercial competitiveness. Regular SCs were thus of the view that their high competence had to be backed by commercially competitive prices as they realised MCs would often market test. The technical competence aspect of job performance was also task specific, consistent with suggestions by Mayer *et al.* (2007) that competence trust cannot be generalised across dissimilar tasks for which parties are known to have demonstrated proven performance. This became evident when a highly trusted structural concrete SC on project Delta had to be given extra supervision on a drainage and groundworks package they were undertaking for the first time. Some SCs that were new to project teams also adopted a rather proactive approach of sending regular unsolicited updates as in their view, increasing the project team's awareness of their progress helped to assert their competence. This was considered a strategy for ensuring that the project team maintained high confidence in their ability to deliver successfully.

The perceived opportunity of securing future work from the MC also had considerable influence on trust during the project. SCs that perceived a greater opportunity to attract future work tended to have higher expectations in the project team than those that had

previously been betrayed or were of the view that their engagement was just a one-off. Alpha for instance realised that a SC in their highest category that contributed towards their tendering process felt betrayed because they were not ultimately awarded the full work package during the project. Alpha used high level communication to manage this situation by inviting the SC to discuss reasons for which the work package had to be split up. Beta to the contrary did not manage such situations amongst their core supply chain firms through effective high level communication. This resulted in the M&E SC for instance expressing a feeling of disappointment and betrayal having not won any work for the 12 months preceding their current appointment. This reveals the impact of not having a dedicated SCM team responsible for managing strategic relationships with SCs.

Effective communication was thus fundamental to two of the trust influencing factors: perceived opportunity for future work and job performance. This perhaps explains what Smyth (2008) referred to as the usual misconception amongst industry practitioners that trust is all about openness in communication, given its influence as a trust building mechanism. These findings echo that of Khalfan *et al.* (2007) who revealed honest communications, reliance and delivery of outcomes were the three most critical factors that influenced trust development in the construction sector. McDermott *et al.* (2004) also identified with some of these factors by citing creative problem solving and relationship uncertainty as factors that influenced trust development. The factors revealed here also support arguments by Shaw (1997) of achieving a balance in trust through results, integrity and demonstration of concern.

Perspectives from both parties also revealed that these trust influencing factors were linked to some MC SCM practices. Payment issues, perceived opportunity for future work and job performance were linked to supply chain motivation and reward, long-term supply chain

relationships and performance monitoring features respectively. This further demonstrates how the MCs SCM process provided a platform for trust influencing factors to promote trust during the project. These trust influencing factors were linked to a display of trustfulness or demonstration of trustworthiness by the two parties. The trustfulness of MC personnel was mainly derived from consistent demonstration of trustworthiness by SCs whilst that of SCs derived predominantly from anticipated future benefits of the supply chain relationship.

9.5 FUNCTIONAL CONSEQUENCES OF TRUST IN THE SUPPLY CHAIN

The views expressed by MC and SC personnel during the projects about the consequences of trust have been summarized in Table 7 and 8 of Appendix C3 respectively. Across the four projects, self-organising behaviour, effective knowledge sharing, relational flexibility and extra commitments were revealed to be linked with the three dimensions of trust i.e. cognition, system and relational-based trust. Relational flexibility and extra commitments were distinctively linked to relational-based trust whereas self-organising behaviour and effective knowledge sharing were linked to all three trust dimensions (see Table 4a of Appendix C2).

MC personnel across the four projects revealed that SCs were prepared to share their knowledge towards the achievement of project objectives irrespective of the nature of trust. This was because SCs had come to realise that one of the key expectations of project teams was to employ firms that could help them save money on work packages due to budgetary constraints. SCs that were working with project teams for the first time were thus keen to demonstrate their competence through value engineering inputs. SCs on Alpha, Gamma and Delta also demonstrated self-organising behaviours when trust was either cognitive, system-based or relational in nature. This was because the project teams developed enough

confidence in SCs through information obtained during supply chain assessments, pre-order and pre-start meetings.

However during project Beta, the project team experienced such self-organising behaviour from SCs only when trust was system-based and relational in nature. The selection of high risk SCs that were not carefully evaluated to ensure they had all the necessary competence required for the job contributed to this absence of self-organising behaviour when SCs were unknown. Some of the SCs were actually reliant on Beta's supervision for successful completion of their work package because they did not have highly competent work supervisors.

Regarding relational flexibility, it was revealed across all the cases that there was more informality when SCs had developed relational-based trust with the MC's project team. Across the four projects, there were instances where some SCs were prepared to proceed with changes although these were just based on verbal instructions. They were confident that amicable agreements could be reached during later negotiations or that at least any losses after such negotiations could be compensated for through future work. Such informal processes are important and sometimes needed to augment formal arrangements but can also be easily mis-managed (Gulati and Puranam, 2009; Styhre, 2009). Gulati and Puranam (2009) and Nadler and Tushman (1997) argued that whilst informal processes can motivate behaviours that are not emphasised by the formal organisation, managers need to seek strategies that capitalize on the informal organisation although this is outside the purview of formal managerial designs.

Currently, informality in supply chain relationships have the tendency to be mis-managed as some SCs expressed the view that project teams make them undertake extra work without

intending to pay, reflecting a form of exploitation. Interestingly, whilst this signalled a lack of the project team's honesty and integrity (trustworthiness), SCs still remained trustful because of the potential value they could derive from future supply chain exchanges. These findings reveal that the reasons for SC's trusting response did not necessarily depend on the trustworthiness of the MC but on the projected value that was expected to be derived from their trusting response (see Hieronymi, 2008).

One SC explained that though they made more money when trust was system-based, it was the MCs with whom they cultivated relational-based trust and consequently relational flexibility – though this made them lose money occasionally - that they attracted their highest value of work annually. They therefore remained trustful, however carefully trying to balance the long-term value of being relationally flexible with the associated short-term costs (cost of maintaining relationally-based trust). In the absence of relational-based trust, SCs tended to be more formal and keen to act in accordance with the contracts. In particular, parties became more calculative during early stages of the relationship when trust was mainly cognitively derived, leading to the display of strict contractual attitudes.

Inter-organisational trust has previously been linked with strategic relational flexibility in supply chain networks (see Young-Ybarra and Wiersema, 1999; Wathne and Heide, 2004). Fryxell *et al.* (2002) and Zaheer and Harris (2005) have also suggested that inter-organisational trust mediates the effect of control on performance such that informal social control mechanisms become positively influential towards the achievement of desirable performance outcomes. Findings from this study have revealed that such flexibility and informality that allows for informal social control mechanisms to thrive are specifically linked to the relational-based dimension of trust as against the cognition and systems-based dimensions. It is this informality that enabled SCs to demonstrate extra commitment by

assisting the project team on issues that went beyond their contractual duties when trust was relational in nature. This was because of the high expectations that such SCs had about the possibility of securing future work, given their relational experience as part of the SCM arrangement with the MC.

Findings also revealed that relational flexibility and extra commitment had implications on cost performance and programme compliance (see Table 4e of Appendix C2) particularly when work packages demanded high asset specific expertise. A SC on project Beta narrated how they had now adopted a more contractual attitude by making sure Beta paid for every little assistance offered due to breakdown of previously existent relational-based trust (see section 6.5.3). This is after Beta had realised the need to rebuild trust with this SC, having realised their asset specific contributions to M&E works that often presented problems when they engaged other M&E SCs.

During instances when asset specific expertise were not required (less complex, risky and critical tasks), project team members across the four projects explained how behaviours that derived from cognition and system-based trust (self-organising behaviour and effective knowledge sharing) were enough to achieve project outcomes: cost performance, quality of workmanship, H&S performance and programme compliance (see Table 4e of Appendix C2). It is therefore prudent that project team members understand the risk profiles associated with work packages so as to gauge the priority they place on promoting different trust dimensions, given that relational-based trust for instance is not necessarily a pre-requisite for successful performance. This finding illuminates previous arguments by Carson *et al.* (2003) that the effect of trust on task performance strengthens based on the client's ability to understand the task involved.

Alpha, Gamma and Delta thus relied on their robust supply chain assessments which provided enough confidence (cognition-based trust) when SCs had not previously worked with the project team. This dimension of trust sufficed for jobs that required low levels of asset specificity. The project teams on the Alpha, Gamma and Delta projects recounted how cognitively derived trust resulted in desirable behavioural consequences – self-organised behaviour and effective knowledge sharing. However, when higher levels of asset specificity were required, they emphasised their decision to opt for SCs with whom they had developed relational-based trust although this was sometimes at a premium (see section 5.6.3). It was only in the Beta case that self-organised behaviour had to be derived from system and relational-based sources because the development of cognition-based trust was largely impeded by their poorly coordinated SCM processes.

Bachmann and Inkpen (2011) have previously argued that during earlier stages of relationships and in situations of low asset specificity, institutional arrangements tend to become very important for trust creation. Consistent with such arguments, the MC's SCM process, and in particular the supply chain assessment process was revealed as important for the development of swift trust (cognition-based trust). According to previous authors (see Lewicki and Bunker, 1996; Meyerson *et al.*, 1996), such sources of trust are required for one-off transactions where time and energy cannot be devoted to building trust-based relationships through repeated face-to-face contacts. The three trust dimensions therefore have varying functional consequences which become desirable under different project circumstances, reflecting the contingent nature of trust as an essential ingredient for achieving performance (Krishnan *et al.*, 2006; Chow *et al.*, 2012). This further places into perspective previous links between trust-based relationships and performance of projects (see CII, 1993; Zaghloul and Hartman, 2003). Zaghloul and Hartman (2003) revealed that

trust-based relationships reduce transaction costs of projects through less reliance on formal contractual provisions.

Krishnan *et al.* (2006) however found evidence that trust mattered more to performance under behavioural uncertainty (when there is difficulty in predicting partner actions) than under environmental uncertainty (highly unstable economic conditions). They revealed that trust contributes to ‘strategic blindness’ by limiting cognitive efforts of partners which results in inadequate response to challenges posed by an uncertain economic environment. Thus in the presence of high environmental uncertainty, cognitive comfort as a result of trust results in slow response that yields suboptimal decisions. Nonetheless when behavioural uncertainty was high, trust was found to positively influence alliance performance.

Whilst some of these studies have recognized that the relationship between trust and performance may be complicated and contingent to other factors, they often consider trust as a composite construct although its multi-dimensional nature is occasionally acknowledged. Evidence from this study has thus revealed that the mere association of trust and performance is not enough given its multi-dimensional nature. The trust discourse should be narrowed down to the influence of different trust dimensions, as findings suggest that it is the relational dimension of trust that reduces transaction costs of projects due to the inherent relational flexibility that manifests as its behavioural consequence. It is perhaps this lack of such fine-grained analysis of trust that has led some (see e.g. Cox and Thompson, 1997; Aubert and Kelsey, 2000) to argue that trust-based relationships are not a necessary prerequisite for performance.

The above findings thus support the assertion that dependence on strong trust developed through repeated face-to-face contacts might in circumstances of low asset specificity – less sophisticated and non-customized products and services – amount to waste of resources (Williamson, 1985; Barney and Hansen, 1994). Findings have thus far revealed that in the case of MC and SC relationships, strategic SCM practices provide an important institutional framework for trust development across the three dimensions alongside beneficial functional consequences.

9.6 SUMMARY

This chapter has presented a cross-case comparison of findings from the four case projects. The emergent MC SCM practices across the four case study organisations have been presented and discussed with relevant SCM literature. Findings have been discussed on how such strategic SCM practices served as constitutive elements for repeated face-to-face interactions through which inter-organisational trust developed, as well as provided an institutional framework to which psychological expectations were directed. The discussions have revealed how MC SCM practices resulted in trust development across three dimensions, to the extent that trust expectations from both MC and SC personnel were rooted in the MC's SCM framework.

It has also been discussed how the change management process, payment practices, economic climate, perceptions of future work opportunities, job performance and the project specific context influenced both main contractor and subcontractor trustworthiness and trustfulness. These trust influencing factors were also linked to some of the strategic SCM practices. The supply chain motivation and reward strategy of the MCs in particular was revealed as a potential strategy for overcoming persistent late payment problems that are inimical to trust development and very typical of the construction sector.

These cross-case findings have provided a deeper understanding of the relationship between trust and institutional arrangements, with empirical insights into how an institutional practice such as the implementation of a SCM strategy in a MC's organisation contributes to trust development. Based on these cross-case findings, a SCM oriented framework for managing inter-organisational trust and its functional consequences is presented in the next chapter (Chapter Ten)

CHAPTER TEN: FRAMEWORK DEVELOPMENT AND EVALUATION

10.1 INTRODUCTION

Following findings from the cross-case analysis, this chapter addresses the development of a framework for engendering inter-organisational trust in the MC's supply chain and evaluation of this framework from the perspectives of selected participants. The framework development process, including justification of the need for a trust management framework, an overview of the various components that constitute the framework and recommendations put forth as part of the framework are first outlined before discussing the evaluation exercise. This chapter contributes to the fifth objective of the research.

10.2 TRUST ENGENDERING FRAMEWORK BASED ON STRATEGIC SCM

As already discussed in section 2.5.2, there is scope for a framework that can guide MCs on how to build inter-organisational trust using SCM as a strategy. The rhetoric on trust and performance (see section 3.4) has often resulted in efforts to promote an atmosphere that fosters inter-organisational trust development (McDermott *et al.*, 2004), underpinned by the introduction of collaborative contracts e.g. PPC2000 form of contract for project partnering, NEC3 contract suite and JCT 2006 Constructing Excellence contract. However, considering the need for a trade-off between the pursuit of commercial interest and trust, there remains a question as to the optimum degree of inter-organisational trust required for achieving satisfactory performance and circumstances under which collaborative approaches would be most appropriate for meeting performance requirements.

A framework that can guide MCs to understand the implications of their practices and decisions on inter-organisational trust development and its consequences could make a

meaningful contribution to industry efforts. This research thus seized on the opportunity to develop such a framework that provides a structured and coherent SCM approach to inter-organisational trust development in the MC's supply chain. The key objectives of the framework are:

- To highlight the key features of MC's SCM practices that have implications on the manifestation of inter-organisational trust during projects;
- To provide insight into how different dimensions of trust influence the behaviour of supply chain personnel and subsequently project performance outcomes;
- To guide MCs' personnel in SC selection and subsequent management taking into consideration work package risks and other contextual circumstances.

10.2.1 Overview of the Framework

The framework comprises issues that were revealed to have influenced the manifestation of different trust dimensions in the MC's supply chain. It is grounded in the input-process-framework of classic systems theory (see Mohammed and Hamilton, 2007). As such, its main components are:

1. Contextual factors

The contextual factors refer to the specific context within which MCs and SCs have to engage together in delivering a project that satisfies the client's requirements. The contextual factors in this instance are the prevailing economic climate - specifically the market conditions that it presents - and project specific circumstances.

2. Input factors

The input factors in the framework refer to the MC's SCM practices that have implications for inter-organisational trust and SC selection decisions by the team responsible for running the project.

3. Output factors

The output factors in the framework are the nature or dimensions of trust that manifest, behavioural consequences, nature of governance and project performance outcomes. These components are summarized in Figure 10.1.

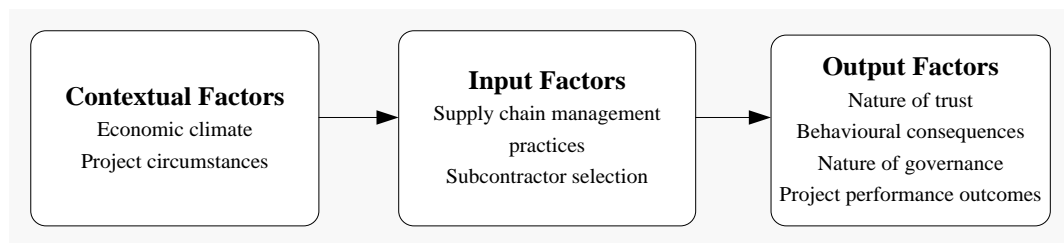


Figure 10.1: Framework components

The various features constituting these three components in Figure 10.1 and their inter-relationships are discussed. These discussions inform the proposed framework for engendering inter-organisational trust using the MC's SCM practice as a strategy, which is presented in Figure 10.2.

10.2.1.1 *Influence of Contextual Factors*

Findings from this study revealed that economic climate and other project specific circumstances influence SC selection decisions. High market competition arising from limited job availability during periods of economic downturn increase the likelihood that high performing SCs can be selected from the market at very competitive rates. During such

periods, there is an incentive for MCs to move away from their regular supply chain SC's and select competitively from the market so as to meet restricted budget allocation for different work packages. Conversely, during periods of economic growth, SCs claimed their order books were mostly full and their priority was to only accept work from MCs with whom they had developed strategic supply chain relationships. Due to such abundance of work during economic growth periods, there is also an increase of rogue SCs, making it a challenge for MCs to attract high performing SCs for their projects in the absence of strategic supply chain relationships. The economic climate and specifically the extent to which it influences the switch between transactional – through market competition - and relational approaches is thus a contextual factor that influences SC selection decisions.

The client's influence and flexibility of the project budget also emerged as project specific circumstances that influenced SC selection decisions. Where the client organisation aimed to promote the use of local SCs for instance, the MC's project team had to ensure that some work packages were awarded to firms that were local. These were more likely to be external to their supply chain base. It was also revealed that projects won on competitive tendering basis were more likely to be on tighter budgets than negotiated projects. Commercial pressures as a result of such restricted project budgets increased the project team's inclination towards competitive SCs that were sometimes external to their supply chain base. Cross-case findings revealed that these contextual factors were determinants of trust dimensions that manifested during projects (see Table 3a and 3b of Appendix C2). This is illustrated in Figure 10.2.

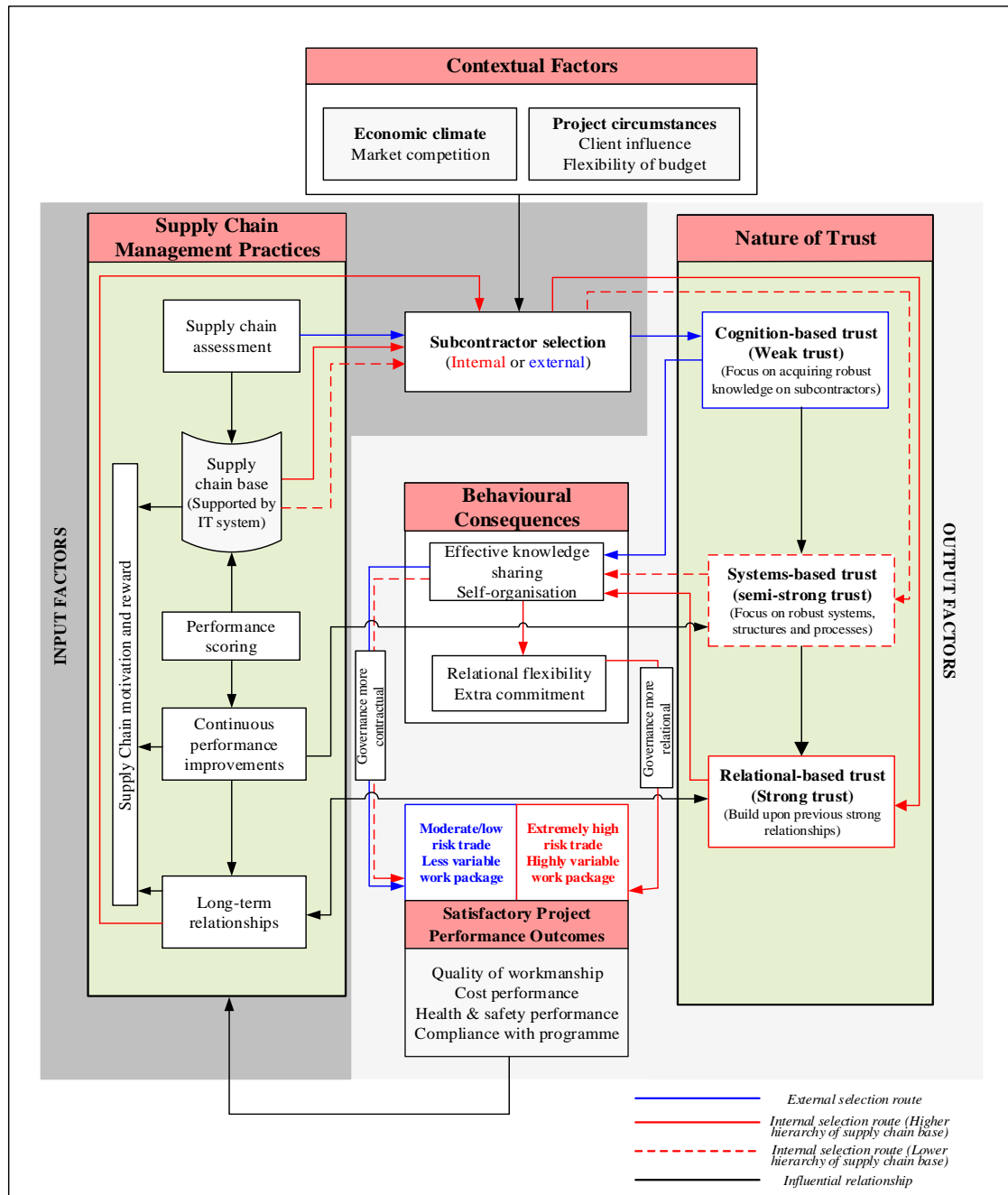


Figure 10.2: Proposed SCM framework for engendering trust in the main contractors supply chain.

10.2.1.2 Supply Chain Management Practices

From the cross-case findings, features that constituted the MC's SCM practices influenced the nature of trust that manifest between MC's and SC's during project delivery (see Table 2d of Appendix C2). A supply chain assessment, which is the first SCM process in Figure

10.2, was undertaken to evaluate SCs before they were registered onto the supply chain database in a given (usually lower) category. This exercise sometimes commenced from ‘meet the buyer days’ where SC’s were invited for supply chain interviews. This assessment continued at the project level through pre-order interviews (see section 9.3.3).

During SC selection for various work packages on a project, the MC’s project team had the option of either awarding a work package to a previously unknown SC after rigorous supply chain assessments or selecting a SC from their internal supply chain base. Given the categorization levels in the MC’s supply chain base, which reflected the degree of trust, connectedness and strategic contribution of SCs to their (MCs) business operations (see section 9.3.2), the project team had to also decide on which category to select a SC from their internal supply chain base. This supply chain base was supported by a bespoke or proprietary supply chain IT system. The MC’s project team also scored SC performance during the project and these scores were logged onto the IT system so as to keep track of supply chain performance (indicated as performance scoring in Figure 10.2).

MCs also engaged SCs that constituted their internal supply chain base in CPI activities through trainings, workshops and seminars or high level discussions where performance targets are reviewed and future targets set. Such CPI initiatives were initiated as part of the MC’s strategy of fostering long-term collaborative supply chain agreements where SCs could gradually progress and grow over a period of time to become strategic supply chain partners (shown as long-term relationships in Figure 10.2). The desire of SCs to gain highest status on the MC’s supply chain base, CPI activities, and realization of long-term supply chain relationships also feed into the MC’s supply chain motivation and reward strategy as shown in Figure 10.2. This was in addition to the MC’s promotion of fair payment practices as a supply chain motivation and reward strategy (see section 9.3.8). During SC selection at

the project level, the MC's project team had to make crucial decisions of either selecting regular SCs from their internal supply chain base or selecting externally from the market.

10.2.1.3 *Nature of Trust*

The selection of SCs from the external market made cognition-based trust the dominant dimension in supply chain relationships during the project. This is because the project team's confidence was underpinned by knowledge acquired during supply chain assessments where efforts were made to ensure that a SC was suitable for a work package as well as subsequent addition onto their supply chain base. It was the impersonal nature of relationships between the project team and SCs at this stage that made trust cognition-based. Alternatively, selection of SCs from the MC's supply chain base either yielded system-based trust or relational-based trust as shown in Figure 10.2. This depended on the status of the SC on the categorization levels of their supply chain base and the history of working relationship with the project team.

System-based trust became dominant when the selected SC was still progressing to become a long-term collaborative SCM partners. Here, the SC was on the supply base, may have executed some projects with the MC and developed some joint ethos through understanding of the MC's mode of operation, but had not cultivated interpersonal relationships with the project team. The project team however had gained some confidence that such a SC was likely to meet their expectations having already been embedded to an extent in their way of working through engagement in some CPI activities or previous working experience with their company. At this stage however, trust was still impersonal as the degree of familiarity was very limited and interpersonal bonds were non-existent.

Relational-based trust became the dominant dimension when the selected SC was not only selected from the MC's internal chain base but had gradually risen up to higher categorization levels, having successfully executed considerable amount of jobs and developed strong familiarity and interpersonal bonds with different project teams in the MC's organisation. In such circumstances, the project team's confidence thrived on repeated interactions and strong interpersonal bonds that had been cultivated.

As can be seen from Table 2d of Appendix C2, supply chain assessments, CPIs and long-term supply chain relationships were the main SCM features that influenced the emergence of cognition-based, systems-based and relational-based trust respectively. The influence of these SCM features on the emergence of trust across the three dimensions are illustrated in Figure 10.2. These three dimensions of trust give rise to different behavioural consequences during the projects.

10.2.1.4 *Behavioural Consequences*

All the three trust dimensions were revealed to have promoted effective knowledge sharing and self-organising behaviours as discussed in section 9.5. This was because first time SCs were as keen as regular SCs to perform well on the project so as to build long-term supply chain relationships with the MC. They contributed as much as regular supply chain SCs when it came to proposing value engineering solutions. Thus, the dominance of cognition-based trust in the relationship - which is a weaker form of trust – did not limit opportunities for effective knowledge sharing during the projects as SCs considered it an opportunity to assert their competence to the project team. Self-organising behaviours were also demonstrated by all SCs including first-timers that had been thoroughly assessed and adjudged as high performers during the supply chain assessment phase. The project teams therefore had enough confidence from the supply chain assessment process (cognition-

based trust) that first-timers were capable of self-managing their work packages although governance in this case was rather formal (strictly in accordance with contractual provisions). These two behaviours (effective knowledge and self-organising behaviours) were also present when systems-based and relational-based trust became dominant in the supply chain relationship.

Relational flexibility and the display of extra commitment i.e. going the extra mile were however behavioural consequences that derived mainly from the dominance of relational-based trust in the relationship (see Table 4a of Appendix C2). SCs were prepared to make more sacrifices or accept higher vulnerability by considering the ‘bigger picture’ of future work opportunities that could be accrued from the already established long-term supply chain relationships. Such SCs were prepared to provide tendering assistance through early involvement, work extra shifts to meet the programme, make pre and post-tender design inputs and progress with changes based on mere verbal instructions so as to avoid any project delays. These behavioural consequences had implications on governance modes and the achievement of satisfactory project performance outcomes, as relational flexibility made it possible for the use of informal (relational) approaches to manage SCs during the project.

10.2.1.5 Project Performance Outcomes

Cross-case findings revealed that when the risk profiles of work packages were considered to range from low to moderate, behavioural consequences that derived from cognition and system-based trust alone were mostly enough to achieve satisfactory project performance outcomes in terms of quality of workmanship, cost performance, H&S performance and programme compliance as shown in Figure 10.2 (see also Table 4c of Appendix C2). The risk profiles of work packages were considered low to moderate: when these were less complex (non-customized), not on the critical path, not subject to excessive variations, and

did not require pre or post-tender design inputs from the SC. Due to the absence of relational flexibility, the nature of governance was however much more contractual with limited room for informal agreements that deviated from terms stipulated in the contract.

The project performance outcomes that derived from cognition and system-based trust were also similar except that the dominance of system-based trust (relatively higher level of confidence than cognition-based trust) represented a progression towards the achievement of relational-based trust where the governance mode switched to informal and relational approaches.

Priority was given to extra behavioural consequences (relational flexibility and extra commitment) that derived mainly from relational-based trust when work packages were considered as high risk trades, critical to the programme or highly subject to variations e.g. due to incomplete designs or the very nature of the work package. Such behaviours became beneficial for the realization of satisfactory project performance outcomes. Thus the project team under such circumstances stuck with highly trusted and regular supply chain SCs from their internal supply chain base that had repeatedly delivered and demonstrated enormous commitment during previous projects. Scaffolding was for example described as a highly variable work package that required such relational flexibility for satisfactory performance to be achieved (see section 5.6.3). A highly complex structural steel package was also revealed as a critical and high risk activity that demanded a SC that had been proven over time (see also section 5.6.3).

This relational flexibility in such relationships was also what made governance more informal and relational, ultimately creating the atmosphere where SCs were willing to make additional inputs or sacrifices that ensured the achievement of satisfactory project

performance and outcomes (see Table 4e of Appendix C2). This successful achievement of satisfactory project outcomes by SCs further contributed to the development of long-term supply chain relationships. A summary of the forgoing discussions is illustrated in Figure 10.2.

10.3 IMPLICATIONS FOR PRACTICE

The framework developed in the preceding section has significant implications for understanding the impacts of current practice as well as promoting best practice in SCM to secure optimal project (team) performance. In this regard, a guide is proposed to ensure that the framework can be used in practice as intended.

10.3.1 Framework implementation guide

The MC's project team would initially have to carefully identify the risk profile of each work package; consider the market environment and other project specific circumstances (contextual circumstances) as illustrated in Figure 10.2, before arriving at selection decisions. To determine the risk profile of a work package, considerations should be given to the extent of design input required from a SC, the extent to which the works would be subject to changes, how critical the work package is to the works programme and complexity of the work package in terms of technical requirements and H&S risks.

If the risk profile associated with the work package is considered as low to moderate and contextual factors favour SC selection from the external market, a choice could be made based on the desire to either promote a growing supply chain relationship or building a new relationship particularly if the client requires some use of local SCs. If there is no incentive to promote an existing supply chain relationship and the work package risk profile and contextual factors favour external selection whereas prices of SCs from the MC's internal

supply chain base are far off from the allocated work package budgets, cognition-based trust could be adequate to achieve satisfactory project outcomes. This should however be underpinned by rigorous assessments of the supply chain and accompanied by stringent contractual governance during the project.

Table 10.1: Framework implementation guide

Pathway to follow on framework for satisfactory project performance		Blue pathway	Dashed red pathway	Red pathway
Project context and nature of work package	Characteristics or risk profile of work package, nature of budget and level of pre or post-tender design input required	<i>Low to moderate risk trade e.g. less complex and critical to the programme, Less variable work package, No pre or post-tender SC design input, Restricted work package budget</i>	<i>Low to moderate risk trade e.g. moderately complex and critical to the programme, Less variable work package, Limited pre or post-tender SC design input [Potential and need to further develop an early relationship]</i>	<i>High risk trade e.g. highly complex and critical to the programme, Highly variable work package, Considerable pre and post-tender SC design assistance [Need to retain subcontractor specialist expertise on project]</i>
	Supply chain management focus	<i>Supply chain assessments</i>	<i>Continuous performance improvements</i>	<i>Long term supply chain relationships</i>
Input factors on framework	Selection recommendations	<i>Select firms from market or firms recently registered on internal supply chain base</i>	<i>Select firms from middle to lower hierarchy of internal supply chain base</i>	<i>Select firms from higher hierarchy of internal supply chain base</i>
	Nature of trust required to underpin behaviours	Cognition-based trust: <i>Derived through the acquisition of adequate knowledge on subcontractor performance</i>	System-based trust: <i>Derived by embedding subcontractors into main contractor processes and creation of joint values and ethos</i>	Relational-based trust: <i>Derived by cultivating long-term interpersonal relationships at both project and corporate levels</i>
Output factors on framework	Behaviours that are fostered	<i>Effective knowledge sharing Self-organisation</i>	<i>Effective knowledge sharing Self-organisation</i>	<i>Effective knowledge sharing Self-organisation Relational flexibility Extra commitment</i>

	Desirable governance	<i>Highly contractual forms of governance</i>	<i>Highly contractual forms of governance</i>	<i>Highly relational forms of governance</i>
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To achieve this, the blue path in Figure 10.2 could be followed. Considerations for this route are shown in the third column of Table 10.1. It should however be added as a caveat that were it not for resource and market constraints, the relational-based trust route would ideally be the most favourable for MCs to achieve satisfactory project performance outcomes under all circumstances.

However, if there is an incentive to further develop a growing supply chain relationship when the risk profile of a work package is low to moderate, and contextual factors favour external selection, a SC selected from lower categorization levels of the MCs internal supply chain base could be desirable particularly if their price is close enough to the allocated work package budget. To achieve this, the dashed red path in Figure 10.2 should be followed. This is also shown in the fourth column of Table 10.1.

If the work package falls on the critical path (critical to the works programme), is subject to a lot of design changes (highly variable), and is technically complex (highly sophisticated and customized products and services), then the influence of the contextual factors (budget restrictions and market competition) should be discounted in favour of selection from the MC's internal supply chain base, although this could be at a premium. This would ensure that satisfactory project performance outcomes are achieved by following the red path in Figure 10.2 where relational-based trust and its behavioural consequences could be fostered during the project. This is shown in the fifth column of Table 10.1.

10.3.2 Recommendations Based on Proposed Framework

General recommendations emerged based on the proposed framework for MC SCM practices and inter-organisational trust during projects. Also some additional recommendations that relate to how MCs could further enhance some specific SCM features shown in Figure 10.2 are put forward.

10.3.2.1 General Recommendations

Provided that the MC's strategic SCM process is well structured and properly coordinated, the supply chain assessment feature of their practice can be instrumental for developing cognition-based trust with previously unused SCs. This would be adequate for achieving satisfactory project performance outcomes when risk profiles of work packages are low to moderate and contextual factors favour external selection from the supply chain market.

However, if the risk profile of a work package is adjudged to be low to moderate and tender prices favour selection from the external market, SCs from the lower categorization levels could still be selected from the MCs internal supply chain base as far as they meet allocated work package budgets. This could prove beneficial not only because it provides the opportunity for further development of an early stage supply chain relationship but also because there might have already been some learning curve due to engagements in some CPI activities.

If the risk profile of a work package is adjudged to be high i.e. work package falls on the critical path (critical to the works programme), is subject to a lot of design changes (highly variable), and is technically complex (highly sophisticated and customized products and services), it is recommended that a SC be selected from the highest categorization level of the MC's supply chain base where trust is highly relational and relational flexibility and

extra commitment are inherent behaviours in the supply chain relationship. The flexibility and informality in the supply chain relationship would provide the best environment for dealing with high levels of work package uncertainty or technical complexity, justifying the need to maintain a core of highly trusted and familiar SCs (long-term supply chain relationships) that can be relied upon to make strategic contributions (value leverage) to the MCs business. Efforts should thus be made irrespective of economic climate, to preserve long-term relationships with a core of SCs that can be depended upon to go the extra mile for the MCs business.

10.3.2.2 *Specific Recommendations*

Specific recommendations have been made in relation to some strategic SCM practices of MCs as summarized in Table 10.2. Long-term supply chain relationships, supply chain performance measurements and CPI initiatives could all be oriented towards the promotion of MC's strategic business objectives. This could be for example the promotion of BIM and sustainability agendas across the supply chain, which have become the most vibrant forces that are reshaping the future of construction project delivery. Currently, SCM practices were revealed to be oriented towards H&S, quality and commercial performance as well as SC support for other in-house agenda such as Gamma's design for manufacture and assembly (DFMA) strategy. However, MCs could lever value from their supply chains and maintain momentum towards the long-term delivery of environmental sustainability projects (Smyth, 2011) that meet BIM requirements if: 1) measures relating to BIM and sustainability are incorporated into performance scoring; 2) CPI initiatives are tailored towards these agenda and 3) they become defining factors for establishing long-term supply chain relationships (achieving highest status on the supply chain base).

It is also recommended with regards to CPI initiatives that MCs promote two-way communication and knowledge sharing with SCs in lieu of the traditional one-sided approach of knowledge flows from the MC to the SC. This is because SCs are likely to gain different experiences from other MCs that could be shared beneficially if a collaborative two-way learning atmosphere is fostered.

Table 10.2: Recommendations for improvements in main contractor SCM practices

SCM Features	Specific recommendations
Long-term relationships	<ul style="list-style-type: none"> Align the promotion of long-term supply chain relationships to the promotion of in-house or industry driven initiatives e.g. BIM and sustainability agenda.
Supply chain performance measurement	<ul style="list-style-type: none"> Give subcontractors the opportunity to anonymously reverse-score performance of project team or head office personnel e.g. web-based scoring service so as to genuinely identify potential areas for improvement. Integrate performance measures on contributions to learning and growth into current performance measures especially those that relate to BIM and sustainability
Supply chain IT system	<ul style="list-style-type: none"> Ensure that the supply chain management process is supported by a robust user friendly and functional IT system that can facilitate knowledge sharing about subcontractor strength and weaknesses amongst personnel at both corporate and project levels.
Continuous performance improvements	<ul style="list-style-type: none"> Use supply chain management practice (through continuous improvement efforts) as a platform to get subcontractors up to speed with BIM implementation and sustainability agenda's so as to enhance long-term competitive advantage. Promote two-way communication and knowledge exchange during continuous improvement engagements as a lot can also be learnt from subcontractors that work with a lot of other main contractors across the UK.
Supply chain motivation & rewards	<ul style="list-style-type: none"> Explore the use of dynamic discounting as an alternative supply chain finance strategy to the recent lobby for reverse factoring. Exempt some highly trusted and core supply chain subcontractors from retention deductions where possible so as to improve their cash flows Explore the use of retention guarantees as against retention deductions so as to improve subcontractor cash flows Link early payment schemes and early retention release or retention exemption to high supply chain performance scores where possible.

Though some MCs sought to gain SC feedback through reverse scoring of their project teams, SCs were reluctant to undertake such scoring so as to avoid any finger-pointing. It is thus recommended that rather, SCs be given opportunity to undertake anonymous web-based reverse scoring of project teams after every project so as to obtain constructive

feedbacks that could drive continuous performance improvements. There is however the possibility that such an opportunity could be abused by SCs due to its anonymous nature.

Consistent with findings from this research, a recent construction industry report lamented the issue of delays in the release of retention by MCs, though no mention was made of retention bonds or guarantees as an alternative (BIS, 2013b). It is therefore recommended based on the cross-case findings, that MCs explore the use of retention bonds or guarantees as an alternative to retention deductions that can have a negative influence on SC cash flows. It is also recommended that MCs further motivate and reward their supply chains by linking retention exemptions, early retention release, and early payment schemes to high SC performance scores. It is also recommended that dynamic discounting (early payment for a discount) (see section 2.4.1.6) be explored as an alternative supply chain finance strategy to the much publicised reverse factoring strategy that is beginning to gain momentum in the UK construction industry (Gardiner, 2013b; Gardiner, 2013a; Hurst, 2013). Such cash flow assistance could feed into the supply chain motivation and reward aspect of the MCs SCM practice given that this is the often the most crucial challenge of most SCs.

10.4 FRAMEWORK EVALUATION

The above recommendations as well as the proposed framework which consolidates much of the research findings were presented to the participants for their feedback during the framework evaluation.

10.4.1 Rationale for the Evaluation

The proposed framework, which is a consolidation of the research findings, was evaluated so as to meet the following objectives:

- To confirm from the perspectives of participants if key features that emerged as constituting the MC's SCM process and their influence on inter-organisational trust dynamics were truly reflective of what happens in practice;
- To assess the adequacy and completeness of the framework as a tool for engendering inter-organisational trust through the implementation of SCM in a MC's organisation;
- To evaluate the usefulness of the framework in guiding the selection and management of SCs during projects;
- To evaluate the feasibility of the proposed recommendations on how MCs could further improve upon existing SCM practices as well as use this as a strategy to manage inter-organisational trust during projects.

Based on these evaluation objectives, questions were posed to participants (see Table 1 of Appendix D) after a brief PowerPoint presentation on the research findings, proposed framework and recommendations.

10.4.2 Background of Organisations and Participants

The supply chain managers of three of the case study construction organisations i.e. Alpha, Beta and Delta were selected as part of the target group of individuals for the framework evaluation. These were Alpha's supply chain manager, Beta's chief quantity surveyor (responsible for coordinating the supply chain) and Delta's procurement manager. In addition, a project quantity surveyor from another UK MC that was not part of the study (here pseudo named Sigma) also took part in the framework evaluation process as summarized in Table 10.3. Additionally, a SC that worked on the Alpha project was selected for participation (here pseudo named Gamma).

Table 10.3: Company background of organisation's used for evaluation

Organisation	Years of establishment	Annual turnover	Number of employees	Category of organisation
Alpha	1874	£ 1.8 b	28,000	MC
Beta	1908	£ 800 m	2,300	MC
Delta	1930	£ 2.3b	50,000	MC
Sigma	1977	£ 2 billion	6,400	MC
Gamma	1986	£ 6 million	110	SC

Altogether, five (5) participants participated in the framework evaluation process. They were all male and each had a minimum of 7 years' experience in the construction industry. The minimum age was between 30-40 years and they all had a minimum of university degree qualifications as summarized in Table 10.4. Their respective roles as personnel that were engaged in supply chain activities made them ideal for the framework evaluation.

Table 10.4: Background of participants used for evaluation

Position	Organisation	Gender	Years of experience	Age	Qualifications and professional affiliation
Supply Chain Manager	Alpha	Male	16-20	41-50	University degree
Chief Quantity Surveyor	Beta	Male	> 20	51-60	University degree
Procurement Manager	Delta	Male	>20	51-60	University degree
Project Quantity surveyor	Sigma	Male	7-10	30-40	University Degree
Contracts Director	Gamma	Male	16-20	30-40	University degree + ICIOB

10.4.3 Discussion of Evaluation Feedback

Feedback from the five individually targeted participants that contributed to the evaluation phase are discussed here under three main sections: adequacy and completeness of the framework, usefulness of the framework, and feasibility of the recommendations. Verbatim responses from individual participants have been summarized in Table 2 of Appendix D.

For the sake of brevity, only few interview extracts have been used in this section to discuss the feedback obtained.

10.4.3.1 Adequacy and Completeness of the Framework

The five participants expressed the view that all aspects of the SCM process that reflected current practice had been captured in the proposed framework. This can be seen from the feedback responses (question 1.0, 1.1 and 1.2) summarized in Table 2 of Appendix D. Alpha's supply chain manager made this particular remark about how the framework depicts their SCM practice:

“This is excellent [whiles looking at the framework]. Really, really good. I think what you found out is, you proved why most good main contractors do things. We understand that unless you have good relationships, you won't have successful projects. So, having research to back that gives me a bit more confidence that we are doing the right thing”

Further comments were also made to affirm the inter-relationships presented in the framework. Gamma's contract director for instance suggested that one of the behaviours that derived from relational-based trust was compliance with bid specifications. He explained how they thoroughly investigated bid specifications - for Alpha where they had built up relational-based trust - to ensure that tender figures were accurately compliant with the bid. He explained that the high level of bid compliance was a typical example of a behaviour that fits into extra commitment as a behavioural consequence of relational-based trust depicted in the framework.

All participants also acknowledged the influence of the contextual factors on the selection process. Beta's chief quantity surveyor suggested that clients would have to become more enlightened on how to procure work as they tend to go for cheapest price through

competitive tendering, thus sacrificing the extra value that could be derived from single sourcing. He claimed the current competitive tendering environment sometimes made them select from the market so as to meet restricted budgets. Delta's procurement manager narrated their struggle to maintain regular supply chain SCs and payment arrangements on a current project because the client had engaged them on 60 days payment terms, whereas they had to remain committed to a 35 days agreement with their supply chain. Alpha's supply chain manager also reiterated the influence of economic climate as a contextual factor by emphasising how difficult it had been to maintain and use their supply chain during the current recession period.

10.4.3.2 *Usefulness of the Framework*

The five participants also provided positive comments about the usefulness of the framework as a tool that can guide the implementation of SCM by other MCs or facilitate the selection, effective deployment and management of SCs during projects (see responses to evaluation questions 2.0, 2.1, 2.2 and 2.3 in Table 2 of Appendix D). Beta's chief quantity surveyor made this remark:

"I think again taking on board a main contractor that maybe hasn't gone through the processes, then it [proposed framework and implementation guide] certainly will start to give them a sort of an issue of benchmark as to what they've got to look to do to achieve the existing necessary trust and consistency"

Delta's procurement manager also shared similar views about how MCs that have not come to terms with strategic SCM implementation and the added value that derives from trust-based relationships could understand these issues using the proposed framework. Sigma's project quantity surveyor however mentioned that the extent of the framework's implementation during projects could be restricted by the overall decision maker at management level. He explained that their supply chain manager could sometimes push for

decisions that favoured the cognition-based dimension of trust because the price was cheaper, thus overruling their preference for a tried and tested SC that better suits the risk profile of a given work package.

Gamma's contracts manager commended the emphasis on risk profiling in the framework as he claimed this should be the number one reason for deciding to either select a supply chain partner or go external. He further mentioned some risk profiling considerations as: a complex job, a fast job or an under-priced job that needs to be done on a strict budget.

10.4.3.3 *Feasibility of the Recommendations*

Participant feedback on the feasibility of the recommendations have also been summarised in Table 2 of Appendix D (see questions 3.0, 3.1 and 3.2). Alpha's supply chain manager claimed in relation to the recommendations on CPI activities (see Table 10.2) that they had just held a two-day BIM conference for their supply chain in addition to their mailing out of BIM newsletters. He also expressed delight towards some of the other recommendations relating to performance scoring, and the use of retentions as a supply chain motivation and reward strategy (see Table 10.2). These he claimed would make him look at things differently. Beta's chief quantity surveyor claimed to be looking already into some of the issues raised especially with regard to using retention exemptions as an incentive for their high performing supply chain SCs. Delta's procurement manager also made this remark about the recommendations that were put forward:

"Some of the recommendations you've come out with, I will be putting a lot of reports to our board....hopefully, we will be able to put it in place"

Regarding recommendations on supply chain finance, Alpha's supply chain manager explained his attempt to apply dynamic discounting (early payment for a discount) as a supply chain motivation and reward strategy for their supply chain. However, Alpha's

lawyers had apparently declined the attempt due to the risk involved in a SC being overpaid should they be unable to complete their work package. The other participants reiterated their preference for commitments to 30-35 days payment arrangements as against reverse factoring or dynamic discounting arrangements which they considered to be too complex and unnecessary. In their view, the proliferation of reverse factoring arrangements could promote an extended SC payment culture that was already endemic to the construction sector. All the participants thus expressed the unanimous view that the most appropriate supply chain strategy was to have a fair payment arrangement (of between 30-35 days) that could become an industry norm as against the use of dynamic discounting or reverse factoring.

Beta's chief quantity surveyor highlighted the cost implications of having a dedicated SCM team as the main barrier to implementing some of the recommendations. Gamma's contract manager also made similar comments about 'cost implications' being a potential barrier to the implementation of the recommendations by MCs. He further explained from a SCs perspective how the level of expectation at the relational-based trust level becomes so high that flexibility and informality in the supply chain relationship costs them money. For this reason, he preferred to sometimes operate under supply chain circumstances where cognition and systems-based trust prevailed (i.e. where contractual governance is dominant as shown in Figure 10.2) as they tended to earn more profit. He however acknowledged the difficulty of winning big and complex jobs when trust was not relationally based. These views raise an important subject about the cost of trust in the construction supply chain.

Regarding any additional recommendations, Alpha's supply chain manager discussed their plans to make a one-month early payment to SCs that win monthly H&S awards – as a supply chain motivation and reward strategy. Beta's chief quantity surveyor highlighted

their plans to implement a joint software interface for managing payments that would be very beneficial to SCs as their account departments would then be able to jointly track payments online. Gamma's contract director recommended that intelligent construction clients should also be vetting the MC's SCM especially during transitional periods from economic recessions to economic growth. This he claimed would be very necessary because MCs that failed to bring their highly trusted supply chain through the recession could have problems securing their services during economic growth periods when work becomes abundant.

In summary, feedback from the framework evaluation exercise confirmed the inter-relationships between the strategic SCM practices that emerged from the research, nature of inter-organisational trust and its behavioural and project performance consequences during projects, with further examples provided by participants in support of such inter-relationships. Participants also provided positive feedback about all but one of the recommendations made: the exception concerned dynamic discounting as a supply chain motivation and reward strategy, where they unanimously agreed that the most appropriate approach was for MCs to apply more commitment to the promotion of fair payment arrangements (of between 30-35 days) as an industry norm.

10.5 SUMMARY

This chapter has discussed the development of a SCM oriented trust engendering framework that emerged from cross-case findings. A framework implementation guide has also been presented alongside general recommendations for managing inter-organisational trust using SCM as a strategy. Specific recommendations for further improvement of some SCM practices have also been presented. Furthermore, findings from the framework evaluation

process that involved five selected participants have been discussed. The next chapter (Chapter Eleven) presents a conclusion to the research.

CHAPTER ELEVEN: CONCLUSIONS AND RECOMMENDATIONS

11.1 INTRODUCTION

This chapter presents conclusions and recommendations of the study on how adoption of strategic SCM practices by UK MCs influenced inter-organisational trust development. A summary of how each research objective was achieved is first outlined. The main conclusions of the study are then highlighted before discussing the study's contribution to theory, methodology and practice. Additionally, practical implications of the study's findings, research limitations and consequently recommendations for future research are discussed. This chapter contributes to objective seven of the research which concerned the development of conclusions from the study and making recommendations.

11.2 ACHIEVEMENT OF RESEARCH OBJECTIVES

The research objectives were presented in section 1.5 of Chapter One. Altogether, seven research objectives were formulated so as to achieve the aim of the study. These seven objectives have been achieved through the application of a rigorous methodological approach presented in Chapter Four. The methods applied towards the achievement of each research objective are summarised in Table 11.1 and briefly discussed in this section.

Table 11.1: Method of achievement of research objectives

Research aim	Research objectives	Method of achievement	Discussed in:
To explore inter-organisational trust development and its functional consequences within the context of SCM practices adopted by UK MCs.	1. To develop understanding of supply chain management from generic management and construction management literature.	Reviewed extant literature on supply chain management.	Chapter Two
	2. To develop understanding of inter-organisational trust from generic management and construction management literature.	Reviewed extant literature on inter-organisational trust.	Chapter Three

Research aim	Research objectives	Method of achievement	Discussed in:
	3. To investigate how inter-organisational trust manifests and develops in the context of MC SCM practices as well as its functional consequences.	Undertook exploratory interviews, a SCM workshop, direct observations and documentary analysis using four case study organisations and live projects where the MC's project team were working in conjunction with SCs that constituted their supply chain.	Chapter Four
	4. To analyse any data collected about SCM practices in a MC's organisational context and its influence on inter-organisational trust during projects.	Transcribed interviews, organised observation notes and relevant documents onto an integrated platform using QSR Nvivo 9 software for qualitative data analysis. Coded all transcripts, field notes and documents to generate emerging themes through an inductive process. Explored patterns between emerging themes and constantly matched empirical patterns to research questions posed in the study.	Chapter Five, Six, Seven, Eight and Nine.
	5. To develop a SCM oriented framework that can engender inter-organisational trust between MCs and SCs with potential performance benefits.	Developed a framework based on cross-case findings on SCM practices and their consequent influence on inter-organisational trust and its consequences.	Chapter Ten
	6. To evaluate the proposed framework through selected supply chain managers and project-based construction practitioners.	Evaluated the proposed framework through individual (one-to-one) PowerPoint presentations and semi-structured feedback interviews with three (3) supply chain managers, one (1) project QS and one (1) SC.	Chapter Ten
	7. To draw conclusions from the study as well as make recommendations.	Outlined the main conclusions of the study and its contribution to theory, methodology and practice. Discussed recommendations for practice as well as future research suggestions that derived from the study's limitations.	Chapter Eleven

11.2.1 Review of Literature on the Strategic Supply Chain Management Perspective

The first objective of this research was to develop in-depth understanding of supply chain management (SCM) so as to explain the relevant concepts and also situate this present study within contemporary academic discourse. This objective was achieved in Chapter Two.

Literature was reviewed on strategic SCM as well as the various practices that were found to be relevant to this SCM perspective. The dearth of empirical research on both contractor driven SCM and the viewpoint that inter-organisational trust could emerge from SCM implementation were used in this chapter to argue ‘the need’ for this present study.

11.2.2 Review of Existing Literature on Inter-organisational Trust

In Chapter Three, the concept of inter-organisational trust was defined based on insights from different academic and theoretical perspectives. Furthermore, the different concepts required for understanding the multi-faceted and sometimes elusive nature of trust were discussed i.e. attributes of trust, subjects and objects of trust, trust and trustworthiness, interpersonal and inter-organisational trust, and modes of trust production. The factors that influence inter-organisational trust development in construction were also argued before a discussion on how inter-organisational trust could contribute towards direct economic outcomes, intermediate relational outcomes and other indirect effects during business exchanges. Additionally, recent construction industry efforts aimed at promoting trust-based relationships were reviewed before concluding with arguments on the need for sustained efforts in promoting trust-based relationships so as to realise the UK construction industry’s visions on issues such as BIM and sustainability.

11.2.3 Inter-organisational Trust Development in the MC’s Supply Chain

Objective three of this research was to empirically investigate the development of inter-organisational trust within the context of the MC’s SCM practices. To achieve this, different methodologies and research designs were evaluated in chapter four. A multiple case study design was adjudged the most appropriate for unravelling the complex subtleties of inter-organisational trust development in the MC’s supply chain during projects. A case study protocol was prepared (see Appendix B) and case study investigations were undertaken

across four purposefully selected UK MC organisations that had implemented strategic SCM.

11.2.4 Analysis of Empirically Gathered Data

The fourth objective of this study was to undertake a robust analysis of the gathered data. Data obtained from multiple sources across the four case studies were integrated onto one platform using the qualitative data analysis software: NVivo 9. This was after verbatim transcription of audio interviews and word processing of field notes and hardcopy documents. Documents, field notes and transcripts were then coded through an inductive process of generating free nodes (open codes) in NVivo before assembling these into tree nodes (broad themes, sub-themes and categories) as a clearer picture began to emerge (see final coding structure in Appendix C4). Thematic analysis across the emergent themes was then undertaken to explore patterns using the matrix coding query tool in NVivo9 (see Appendix C2 for output results). These queries were used to generate thematic conceptual matrices that were used to present within-case and cross-case findings. Within-case findings from the four cases were presented in Chapters Five, Six, Seven and Eight.

The cross-case analysis compared and contrasted findings from the four case studies through a pattern matching process. Emergent issues from these cross-case comparisons were also discussed using extant literature on SCM and inter-organisational trust. This was presented in Chapter Nine.

11.2.5 Development of a SCM Oriented Trust Engendering Framework

The fifth objective of this research was to develop a SCM oriented trust engendering framework. Findings from the cross-case analysis were used to develop this framework in Chapter Ten. This framework consolidates findings on the MCs' SCM practices, contextual

factors such as economic climate and project specific circumstances, different trust dimensions and their functional consequences (behavioural and project performance implications).

11.2.6 Evaluation of Proposed Framework

The sixth objective of this research was to evaluate the proposed framework using selected participants that were engaged in SCM related activities. This was undertaken using five target participants, three of whom were managers responsible for setting the SCM strategy in three of the case study organisations. The fourth participant was a project QS with another large UK MC that practiced SCM and the fifth participant was a SC that worked on project Alpha. Due to logistical difficulties and ethical agreements that had to be adhered to, it was impossible to bring all five participants together for a focus group meeting. Thus, individual meetings were arranged with each participant to give a brief presentation of the findings, proposed framework and recommendations. Feedback questions were then posed to participants to obtain their views on the research findings, framework and recommendations. Findings from this evaluation process were presented in chapter ten, and verbatim responses from all the five participants on the feedback questions are summarised in Table 2 of Appendix D.

11.2.7 To Draw Conclusions and make Recommendations from the Study

The seventh and last objective of this research was to draw conclusions and make recommendations from the study. This is accomplished in the present chapter, where the main conclusions from the research are discussed before outlining the study's contribution to theory, methodology and practice. The practical implications of the study's findings, as well as recommendations for further research have been presented in this chapter.

11.3 CONCLUSIONS OF THE RESEARCH

The main conclusions that could be drawn from the research in relation to research questions posed are that:

- Strategic SCM practices of the selected UK MCs comprise eight key features. These are supply chain orientation, supply base management, supply chain assessment, long-term supply chain relationships, supply chain performance measurement, supply chain information technology, continuous performance improvements and supply chain motivation and reward.
- Trustfulness of MC personnel derives from consistent demonstration of trustworthiness by SCs; making SCM features such as supply chain assessments, performance scoring, CPI initiatives and long-term supply chain relationships instrumental to the trust development process. However anticipated future value of supply chain relationships i.e. future work expectations, remains the main trust development driver for SCs. This makes SCM features such as supply base management (status on categorization level), long-term supply chain relationships and supply chain motivation and reward instrumental to the trust development process.
- The MC's strategic SCM practices contribute to emergence of inter-organisational trust across three dimensions i.e. cognition-based, system-based and relational-based trust. Cognition-based trust derives mainly from knowledge acquired through robust supply chain assessments. System-based trust mainly derives from the realisation of joint ethos through continuous performance improvement initiatives rather than prevailing sub-contract agreements, emphasising the fiduciary nature of

MC and SC relationships. Relational-based trust derives from the extent to which familiarity and interpersonal bonds are realised through promotion of long-term supply chain relationships.

- Unfair payment practices remains a persistent problem that inhibits inter-organisational trust development in MC-SC relationships. However commitment to achievement of the fair payment arrangements, as encapsulated in the MC's supply chain motivation and reward feature of their SCM practice, remains instrumental to overcoming this problem and consequently improving trust in the supply chain.
- Beneficial behavioural consequences derive from all three trust dimensions, except that additional benefits i.e. extra commitments and relational flexibility only prevail when trust is relational. Functional consequences of trust such as reduced transaction costs during projects are thus linked primarily to the relational-based dimension of trust as the inherent relational flexibility and informality in the supply chain relationship allows for relational forms of governance to become beneficial during projects.
- Strategic SCM practices of MCs can be used to prioritize and promote different trust dimensions (cognition, system and relational based) and their associated behavioural consequences, depending on which dimension is considered most desirable based on work package risks.

11.4 RESEARCH CONTRIBUTIONS

This research makes useful contributions to theory, methodology and practice. The theoretical contributions (section 11.3.1), methodological contributions (section 11.3.2) and practical contributions (section 11.3.3) are presented in this section.

11.4.1 Theoretical Contributions

Limited empirical research exists on factors that affect inter-organisational trust development and particularly on how to establish trust in temporary organisations such as projects (Diallo and Thuillier, 2005; Karlsen *et al.*, 2008). Bachmann and Inkpen (2011) admitted in their conceptual study of institutional-based trust that as yet, the role of institutions in trust development is not sufficiently researched in empirical terms although convincing arguments are often made about the importance of institutions in trust development. They therefore called for empirical research that can provide a clear understanding of how institutional arrangements precisely influence actions and decisions of potential trustor's and trustees. This suggestion was to the effect that advanced socio-economic systems can hardly rely on only interaction-based forms of trust.

To contribute to the bridging of this knowledge gap, findings from this present research have provided empirical accounts of how one such institutional arrangement (strategic SCM) served as a trust generating mechanism during IORs within different project and organisational circumstances. The MCs' SCM practices did not only serve as constitutive elements of face-to-face interactions through which inter-organisational trust developed, but also provided the institutional framework to which trust expectations were directed. The study revealed how some aspects of the MC's SCM practice - particularly rigorous supply chain assessments, supply chain performance scoring and the use of highly functional supply chain IT systems engendered cognition and system-based trust (institutional-based trust) but not necessarily relational-based trust (interaction-based trust). Again, it was revealed how other aspects of the MCs' SCM practice such as supply base management, CPI activities, and establishment of long-term supply chain relationships contributed to the emergence of system and relational-based trust.

Furthermore, empirical support is provided for the view that inter-organisational trust could also be a consequence of SCM adoption although the antecedent view is mostly featured in literature (see Mentzer *et al.*, 2001; Green *et al.*, 2005; Morledge *et al.*, 2009; Akintola *et al.*, 2011). This study has also provided a richer understanding of inter-organisational trust development during projects, not least with regards to how SCM (through the supply chain motivation and reward feature) could play a crucial role in overcoming the persistent problem of late payments in the UK construction industry.

Additionally, a multi-dimensional account of trust in IORs which is often lacking empirically, is provided. Most studies either adhere to a narrower view of trust by taking the micro-level psychological perspective or macro-level institutional views (Bachmann and Inkpen, 2011). An integrative, multi-dimensional view of trust that is not restricted to any theoretical or disciplinary tradition is adopted in this study. This multi-dimensional view has revealed that rather than concentrate on the broad concept of trust as is the case in most studies, emphasis should be placed on the different trust dimensions (cognition, system and relational-based trust) as these are influenced by different generative mechanisms. This study has thus provided a more penetrating analysis of inter-organisational trust and its functional consequences.

The functional consequences of trust during projects should also be narrowed down to the consequences that different trust dimensions could present during inter-organisational relationships. In inter-organisational exchanges where trust is considered to be absent, there is arguably a degree of trust although this could be of a more cognitive and weaker nature. Such cognition-based dimensions of trust have been revealed to be sufficient for achieving desirable project performance outcomes under low-risk circumstances. Yet an attribution of performance benefits to trust in its broad sense only seems to be directed to the stronger

relational-based dimension in the literature (see Doloi, 2009; Kumaraswamy *et al.*, 2010; Smyth *et al.*, 2010). Perhaps attributing the broad multi-dimensional concept of trust to performance is what has resulted in mixed findings about trust and performance (see Cox and Thompson, 1997; Aubert and Kelsey, 2000; Sako, 2007). This study has thus provided a more penetrating analysis of how different trust dimensions varyingly influence behaviour of project participants and consequently project specific outcomes.

Previous studies have focused extensively on client-driven SCM in construction (see Holti *et al.*, 1999; Briscoe *et al.*, 2004; Cain, 2004; Potts, 2009; Rimmer, 2009) with limited empirical research on contractor-driven SCM (King and Pitt, 2009). Thus, there is limited empirical support for activities that should constitute the MCs SCM practice, which could make its implementation less structured. Data obtained from the case study organisations have been used in this study to assemble key features that constitute MC SCM practices from the strategic viewpoint i.e.: supply chain orientation, supply chain assessments, supply base management, supply chain performance scoring, CPI engagements, supply chain IT system, long-term supply chain relationships and supply chain motivation and rewards. The syntheses of these SCM features contribute to knowledge on contractor-driven SCM implementation. It provides a structured and coherent framework of features that should be incorporated into a MC's SCM strategy so as to realise long-term supply chain benefits.

11.4.2 Methodological Contributions

Measurement scales administered in the form of a questionnaire, have been used to measure trust amongst construction practitioners (see e.g. Shek-Pui Wong and Cheung, 2004). Such quantitative methodologies however present some shortcomings as trust involves constantly changing expectations (dynamic nature of trust) especially during projects. There is also the methodological difficulty of exploring how one's own trust, others trust or both can predict

one's own or the other's cooperation (see Ferrin *et al.*, 2007) when applying such quantitative approaches. Ferrin *et al.* (2007) suggested that in dyadic interpersonal and inter-group relationships, one's (trustor's) own trust, other's (trustee's) trust or both can be predictors of cooperative behaviour.

The methodological approach adopted in this study (live case study projects) made it possible for inter-organisational trust to be explored from the perspective of MC and SC personnel in both capacities as trustors and trustees. This revealed that trustfulness and trustworthiness of both parties are required for mutual trust to be realised during projects. Thus the ability to collect integrated views, whereby MC and SC personnel shared perspectives in their capacities as both trustors and trustees was thus a significant methodological contribution.

11.4.3 Practical Contributions

The framework developed from the cross-case findings could serve as a practice-based guide for MCs when deciding on the most appropriate SC to select for a work package. The framework also provides a previously non-existent practical guide for engendering inter-organisational trust using SCM as a strategy. This gives MCs a better understanding of how an institutional mechanism such as the enactment of strategic SCM contributes to the emergence of institutional and interaction-based trust. This could serve the following purposes: (1) a roadmap for other MCs or SCs that are interested in implementing their own SCM to follow; (2) for benchmarking and improving upon SCM practices and (3) for staff training sessions to explain the rationale for adopting SCM and its implications for inter-organisational trust during projects.

11.5 PRACTICAL IMPLICATIONS

The research findings present practical implications for MCs, SCs and construction clients, some of which have already been discussed in section 10.3.2. Firstly, the flexibility and informality in supply chain relationships when trust is relational-based provides the best environment for dealing with high levels of work package uncertainty or technical complexity, justifying the need to maintain a core of highly trusted and familiar SCs (long-term supply chain relationships) that can be relied upon to make strategic contributions (value leverage) to the MCs business. Efforts should thus be made irrespective of economic climate, to preserve long-term relationships with a core of SCs that can be depended upon to go the extra mile for the MCs business.

MCs should also orient SCM features such as long-term supply chain relationships, supply chain performance measurements and CPI initiatives towards the promotion of strategic business objectives. For example, these could be aligned towards BIM and sustainability agendas, which have become the most vibrant forces that are reshaping the future of construction project delivery. To achieve this, 1) measures relating to SC BIM and sustainability capabilities should be incorporated into performance scoring; 2) CPI initiatives should be tailored towards these agenda and 3) they should become defining factors for establishing long-term supply chain relationships (achieving highest status on the supply chain base). MCs should also promote two-way communication and knowledge sharing with their supply chain during CPI activities with SCs in lieu of the traditional one-sided approach geared towards a flow of knowledge from the MC to the SC. This is because SCs are likely to gain different experiences from other MCs that could be beneficially shared if a collaborative two-way learning atmosphere is fostered. Such two-way knowledge diffusion could prove mutually beneficial for the supply chain as a single entity striving for long-term competitive advantage.

Furthermore, MCs should strive to promote fair payment practices as part of the supply chain motivation and reward aspect of their SCM practice. MC payment departments can work closely with their supply chain counterparts through a common IT interface to streamline the processing and clearing of invoices, especially amongst the 20% of SCs that attract the highest value of work on annual basis. MCs could also explore the use of retention bonds or guarantees as an alternative to retention deductions that can have detrimental effects on SC cash flows (Hughes *et al.*, 2000; BIS, 2013b). Additionally, MCs could also motivate and reward their supply chain by linking retention exemptions, early retention release, and early payment schemes to high SC performance scores during projects. These practices have the potential to promote a fair payment culture across the construction supply chain in the long-term.

A practical implication of this study for SCs is that their boundary-spanning representatives need to proactively develop competence triggers (mannerisms, communication techniques, professional negotiation and presentation skills) that can be useful during first time negotiations with MCs (supply chain assessments or pre-order interviews). These boundary-spanning representatives should be able to demonstrate their company's technical competence as research findings revealed that the emergence of cognition-based trust is dependent on such first time impressions of competence when there has never being prior interaction.

Intelligent construction clients could also audit the MC's SCM as part of tender evaluation so as to adjudge efforts by MCs to add value to their project through their supply chain. This exercise could become more useful during transitional periods from economic recession to economic growth as it would reveal if MCs have brought their highly trusted supply chain SCs through the recession with the vision of increased value creation. By undertaking such

audits, the client could also get early indications of MCs that are likely to have difficulties in securing services of highly trusted SCs during economic growth periods when work becomes abundant.

11.6 LIMITATIONS OF THE STUDY

Given that the construction industry is renowned for its dependence on multi-layered subcontracting (see Yik and Lai, 2008; Manu *et al.*, 2010a; Tam *et al.*, 2011) and the tendency for a culture of distrust to be more pronounced further down the supply chain tiers, it would have been important to explore SCM and inter-organisational trust related issues further downstream of the construction supply chain. SCM practices and inter-organisational trust issues in this study were however restricted to the relationships between the MC and first tier SCs due to the limited time scale for the study and access restrictions to case studies.

Secondly, because late payments were revealed as a significant issue that contributes to distrust in supply chain relationships, an important line of inquiry could have been to explore in-depth, how adoption of supply chain finance mechanisms (reverse factoring and dynamic discounting) influences SC cash flows and inter-organisational trust. However, only one out of the four case study organisations had in place a dynamic discounting arrangement as a strategy to assist their supply chain with fortnightly payments when this was needed. As none of the interviewed SCs on their project had been a beneficiary of this arrangement, there was no opportunity to interrogate its influence on SC cash flows.

Thirdly, this study was undertaken with four large UK MC organisations that had implemented strategic SCM principles. Findings from this research can therefore not be empirically generalizable throughout the wider UK construction industry. Application of

findings would have to be restricted to cases that bear similarities to those reported in this study.

11.7 RECOMMENDATIONS FOR FUTURE RESEARCH

Based on the study limitations discussed in the previous section, the following opportunities exist for future research:

1. There is scope to explore in-depth, the influence of MC's SCM practices on firms further downstream of the construction supply chain i.e. tier two and tier three SCs. This can be based on a single longitudinal case study;
2. There could be further investigation of how the adoption of supply chain finance schemes by some UK MCs influences SC cash flows, inter-organisational trust and long-term profitability of construction supply chains;
3. Further studies similar to this could also be undertaken using MCs that are at the mid to lower end of the construction league tables to explore if their SCM practices and their consequent influence on inter-organisational trust dynamics are similar to findings reported in this study;
4. An industry wide quantitative study to test the generalizability of interrelationships between strategic SCM and inter-organisational trust constructs as presented in the proposed framework can also be undertaken.

All these studies, should they be undertaken, would provide a more holistic understanding of strategic SCM and inter-organisational trust in construction.

11.8 REFLEXIVITY

A researcher's background will affect what they choose to investigate, angle of the investigation, methods judged as most appropriate and findings and conclusions drawn from the research (Malterud, 2001). In this section, I attempt to reflect upon my role as the researcher, my previous personal and professional experiences, pre-study beliefs and any pre-conceptions that could have influenced the research process.

I began this research, having become all too familiar with the usual cliché about adversarial relationships in construction. My experience during a stint with an architectural and quantity surveying practice in Ghana as a quantity surveyor - where relationships with contractors' quantity surveyors became ever increasingly antagonistic - exposed me to the issue of distrust that confronted the construction sector. I hardly enjoyed any of the heated arguments about our interim valuations for payment. Deep within me, I knew that though the contractor's quantity surveyors were usually striving to make up for underpriced works, we had sometimes overestimated their intention to be opportunistic with variations. I knew we had sometimes been too rigid in our approach, not wanting to take any chances. The issue of distrust was clearly never a one-sided affair.

I later joined a university as a teaching and research assistant, where I worked with a lecturer who had just completed a study on team integration in the UK construction industry. It was during this period that I became familiar with efforts to promote a trust-based collaborative agenda in the UK construction industry, though achievement of such a vision sounded too daunting for me considering my image of the predominantly traditional adversarial construction context in Ghana. I believe it was this background that aroused or motivated my interest to study inter-organisational trust development in construction supply chains.

The research journey then began initially from an exploration of philosophies of human nature, first arriving at Machiavellian conclusions that only the existence of detection and punishment mechanisms could deter self-interest behaviours. Then came David Hume's treatise of Human Nature, who being an enlightenment philosopher, presented other more humane aspects of human nature. Hume's view that human beings could be guided by a sense of morality, love and care for others when there was no advantage to be reaped, on a morality that arose from a sense of feeling and not of reasoning, where contemplation of actions classified as immoral gave rise to feelings or sentiments of blame and guilt, seemed a step forward. Yet his acknowledgement that the existence of love, sympathy and care could still be dictated by self-interest meant that the voyage thus far was raising more questions than answers. I further explored economic perspectives of trust, where game theoretic experiments had often been inconclusive as to the extent of rationality or irrationality associated with trusting behaviour. Psychological perspectives were also lacking in some respect as effects of personality differences on trusting response could not always account for trusting behaviour.

At this stage, it had also become vividly clear that trust was never static, but rather a constantly changing situational concept. This further raised my concern about the extent to which the use of trust questionnaires in research could reflect such constantly changing realities. How then could the dynamic nature of trust be studied? What methodologies were most plausible for exploring the trust development process in inter-organisational relationships during projects? I finally settled on an interpretative epistemological approach not only because it had become apparent that this provided the best strategy for understanding the dynamic and situational nature of trust, but also because it aligned with my belief that balanced views from different supply chain actors were required to develop a holistic understanding of the trust development process.

I was fortunate to get case study access to four major UK main contractors, who considered the subject interesting at a time when they were faced with challenges of an austere market environment. To what extent were they to pursue collaborative approaches and trust development at the expense of their business survival? They appeared eager to tell their stories, not least maintaining hopes that some beneficial insights could emerge from the research. At that point however, I could only concentrate on hearing their stories, exploring their multiple realities and giving voice to both main contractors and subcontractors whilst hoping also that some fresh insights could be offered.

I had to analyse the different qualitative type data obtained from across the four case studies by making interpretations of underlying meanings. This interpretation process was influenced by my personal beliefs, values and sense making as a researcher. I therefore duly acknowledge my subjectivity within this process despite striving nonetheless to maintain good balance as well as reflecting fairly, the multiple views from both parties (main contractor and subcontractor personnel). This strive for fairness could only have been my least contribution as a researcher to telling two sides of the story about trust development from within an industry that has ever so often been associated with unfair practices. I hope therefore that this reflexion has somewhat demonstrated how my background, personal values, and prior knowledge as a researcher influenced the research process.

11.9 SUMMARY

This chapter has discussed steps taken to achieve the research objectives. The main conclusions as well as contributions of the study to SCM and inter-organisational trust theory have also been elaborated upon. The practical and methodological contributions and some practical implications of the study findings have been discussed. The study's

limitations and consequently directions for future research have been proposed. In summary, this research has provided empirical evidence of how the MCs' SCM practices serves as constitutive elements of face-to-face interactions through which inter-organisational trust develops as well as provides the institutional framework to which trust expectations are directed. Accordingly, a framework has been proposed in chapter ten for organisations interested in implementing or benchmarking their SCM practices as a strategy for managing inter-organisational trust and its functional consequences.

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APPENDICES

APPENDIX A: PUBLICATIONS

Peer Reviewed Journal Papers

Manu, E; Ankrah, N.A., Proverbs, D.G., Chinyio, E. (under review) Trust influencing mechanisms in main contractor and subcontractor relationships during projects, *International Journal of Project Management*.

Manu, E; Ankrah, N.A., Proverbs, D.G., Chinyio, E. (2013) A cognitive approach to trust management in construction, *Proceedings of the ICE – Management, Procurement and Law*, Vol. 166, Issue 5, pp. 232 – 239.

Refereed Conference Papers

****Ankrah, N.A., Manu, E.,** Hammond, F.N., Awuah, K.G.B., Tannahill, K. (2013) Beyond sustainable buildings: Eco-efficiency to eco-effectiveness through cradle-to-cradle design, *Sustainable Building Conference 2013*, 3-5 July 2013, Coventry, U.K.

****Ankrah, N.A., Manu, E.** (2013) Towards a framework for investigating socio-cultural barriers to cradle-to-cradle principles in business park developments, *Sustainable Building Conference 2013*, 3-5 July 2013, Coventry, U.K.

****Nuamah, F.A., Manu, P., Manu, E.** (2013) A preliminary inquiry into the applicability of client-contractor partnering in the Ghanaian construction industry, *West African Built Environment Research Conference (WABER)*, 12-14 August 2013, Accra, Ghana.

Manu, E; Ankrah, N.A., Chinyio, E; and Proverbs, D.G. (2012) Influence of the macro-economy on trust in construction supply chains, Submitted to the 28th Annual Association of Researchers in Construction Management (ARCOM) Conference, 3-5 September 2012, Edinburgh, UK.

Manu, E; Ankrah, N.A., Chinyio, E; and Proverbs, D.G. (2011) Control Influence on trust and relational governance in the client-contractor dyad *In: Egbu, C. and Lou, E.C.W. (Eds.) Proceedings of the 27th Annual ARCOM Conference*, 5-7 September 2011, Bristol, UK, Association of Researchers in Construction Management, 455-463.

Manu, E; Ankrah, N.A., Proverbs, D.G., Chinyio, E. (2011) An investigation into the dynamics of trust and control in client-contractor relationships *In: Proceedings of the Joint Association of Researchers in Construction Management (ARCOM) and Lean Construction Institute (LCI) Doctoral Workshop*, 2nd March 2011, University of Northumbria, Newcastle, U.K

****These research papers were developed during the period of study but are not directly related to the research reported in this thesis.**

APPENDIX B: CASE STUDY PROTOCOL

DATA COLLECTION PLAN

As part of our research on managing construction supply chain relationships, a detailed data collection plan has been developed so that we can optimize our limited time and resources during the data collection period. The activities to be undertaken during this period have been listed on the plan in a chronological order from A to E.

- ❖ Activity A is intended to provide an insight into the supply chain management practices of the main contractor before data collection begins on the project and could be undertaken at the head office of the main contractor or other alternative location [see attached interview guide A].
- ❖ Activity B is a brief filling out of information relating to the case study project [see project data sheet B]. Such information includes the nature of work been undertaken, type of procurement arrangement, proposed duration of project etc.
- ❖ Activity C is a review of decisions made before subcontract orders were made for 5 key subcontract packages by package value. This is to provide a more objective insight into how risk was balanced out between trust and price during the selection of these subcontractors.
- ❖ Activity D involves interviews of personnel from the main contractor's and subcontractor's organisation on the project. The interviews would focus on how your feelings and perceptions of the opposite party influence the day to day management of the supply chain firms and the achievement of project goals. Two personnel would be interviewed from the main contractor organisation e.g. Project QS, Project manager or Construction manager. On the part of the subcontractor's, two personnel e.g. Contracts manager and Supervisor or Foreman of five major subcontractors by package value would be interviewed [see attached interview guides D].
- ❖ Activity E involves observations where field notes would be taken. This would be undertaken anytime there is an opportunity to attend a pre-start meeting, project walk around meeting or progress review meetings. These observations include gaining an insight into how grievances are aired, how complaints and problems are handled etc. This would also enable us develop an intimate knowledge or understanding of the project which will help in the story telling as required for the case study approach been adopted for this research.

Just to reiterate again that at no instance will the true identity of interviewees or any organisation be likened to any responses provided as the entire process aligns strictly with the University of Wolverhampton's ethical and safety guidelines for fieldwork, data collection and handling. Also, all instruments for the data collection have been attached to this data collection plan for your attention.

	Instrument/source of information	Target audience	Brief description	Location	Justification/Rationale
A	Preliminary interviews	Supply chain manager/procurement manager	A maximum of 1 hour interview with an interview guide (see attached) to gain an overview of the main contractor's supply chain management practices including some insight into how dimensions of trust, loyalty etc are reflected in these practices.	At the main contractor's head office or any other alternative location	This is to gain an overview of the supply chain management policy of the main contractor. This would be very useful for the cross case analysis between the different projects under investigation.
B	Project data sheet	Construction manager for project or any other personnel who can provide brief information about project.	A one-paged sheet where the required project details can be ticked or entered where necessary (see attached).	On the project or at the head office	This is to provide an overview of the case study project so as to aid reporting of findings and to situate the data in perspective. Thus, the influence of project specific differences on findings could also be inferred.
C	Bid report for selected subcontract packages	Supply chain manager/Procurement manager	To gain some insight into key evaluation criteria based on which selected subcontract packages were awarded and how universal the application of these criteria were across trades.	At the main contractor's head office	This is just to enable a more objective analysis on how the trade-off between trust and price were made for selected subcontract packages. This would also be explored subjectively as part of the semi-structured interviews.
D	Semi-structured interviews	Decision making representatives of the main contractor and selected subcontractors on the project	A maximum of 1 hour interview using an interview guide for main contractors and subcontractors (see attached) to explore how trust manifests in selection and management practices at site level and how individual personalities influences this process. 2 key personnel would be targeted from at least 5 subcontractors on the project.	On the project or any other convenient alternative location	This is to explore from representatives of selected supply chain firms how trust manifests on the project and what the influence is on the overall value of the project. This could expose any gaps between what the main contractor thinks is being done and what is happening in reality. It is expected that any gaps identified would provide a direction for change or areas of improvement.
E	Observations	Top level personnel on the project e.g. contracts manager, supervisors, operations manager etc.	Undertake direct observations on the project to gain a sense of how formal/informal communication patterns are throughout the team, how well subcontractors relate with each other/work together/share information and how problems are dealt with.	On the project	This is to gain some insight into the project under investigation and would also support information obtained from the project data sheet. It would be useful in developing an intimate knowledge or understanding of the project which would help in the story telling. Such information would also be useful when interpreting the findings of the investigation within and across case study projects.

BRIEF RESEARCH PROPOSAL SENT TO MAIN CONTRACTORS

Introduction

The last two decades have seen a move towards greater supply chain integration in the UK construction industry through the use of framework agreements, integrated procurement systems and relational management strategies. It was anticipated that greater integration would yield performance improvements. Unfortunately, there is growing body of evidence which suggests a failure of real integration and collaborative working with the situation progressively worsening further down the supply chain. Ultimately, all the anticipated benefits of integration and collaborative working are not being optimally achieved.

Research Questions

Given that suppliers and subcontractors typically perform 70-80% of the gross work undertaken in most construction projects, success of collaborative efforts across the supply chain would dwell hugely on the extent to which subcontractors are integrated into collaborative arrangements. However, research has also revealed that one of the principal failure factors of collaborative relationships in construction is the lack of trust, and this raises a number of fundamental questions which must be addressed if integration and collaboration are to be fully realised. These key questions which will be explored in this research are as follows:

1. How and to what extent does trust as perceptual measure influence behaviour of construction supply chain members?
2. How have subcontractor related variables e.g. selection criteria, payment regimes and management approaches been influenced by trade-offs between trust-based and other transactional strategies? And what impact do these trade-offs have on performance outcomes?
3. If trust is relevant, then how does trust develop amongst supply chain members during project execution? How is this process influenced by interactions between decision making representatives of supply chain firms?

Methodology

It is intended that these research questions will be explored on case-study projects where different parties representing the main contractors and subcontractors would be interviewed. Also, observations would be undertaken during site meetings to gain a better understanding of the influence trust could have on behaviours of supply chain members when dealing with problems which arise on the project.

Your Contribution

The issues identified above can only be interrogated properly if access is gained to on-going/live projects, and it is to this end that this request is being made to solicit access to one of your company's on-going projects. It is envisaged that access to the project will only be required for a maximum period of six months at no cost to your organisation. Interviews, observations and any other data collected on the project would be strictly confidential and would only be used for research purposes. Also, at no instance would the true identity of the interviewees or organisations be likened to any responses provided. Ethical and safety approval has been sought from University of Wolverhampton to ensure that the entire process aligns with the University's ethical and safety guidelines for fieldwork, data collection and handling.

Expected Outcomes

It is envisaged that this research would provide an insight into circumstances where trust-based or other transactional strategies would be most suitable in achieving anticipated project outcomes. In return for your participation, this trust dynamics framework and other findings from the research would be made available

to you. As a forward looking company seeking to optimise the value derived from your supply chain, it is expected that the insight that would emerge will prove useful to your organisation in helping to devise the most suitable strategies in managing your supply chain.

LETTER TO SOLICIT PARTICIPATION FROM MAIN CONTRACTORS

To Whom It May Concern:

Dear Sir/Madam

**REQUEST FOR ASSISTANCE WITH RESEARCH ON MANAGING CONSTRUCTION
SUPPLY CHAINS**

As part of a research on managing construction supply chains, this study which is being undertaken by the University of Wolverhampton aims to explore how the dynamics of trust influences behaviour of supply chain members during project execution. Findings from this research would be used to develop a framework which could guide your organisation on the most suitable strategies to employ in managing your supply chains depending on which outcomes are anticipated for a particular project as well as other prevailing project circumstances.

Research of this nature largely depends on contributions from industry experts. Thus, as a key player in the UK construction industry, access to one of your projects is fundamental to the success of this research. I would be grateful if I could gain access to one of your on-going projects for a case-study spanning a maximum period of six months at no cost to your organisation. This would involve interviews with some decision making personnel representing the different firms constituting the supply chain on the project, complimented by observations during site meetings regarding how trust influences approaches to handling problems arising on the project. Interviews and any other data obtained from the project would be **STRICTLY CONFIDENTIAL** and used for research purposes only. At no instance would the true identity of any interviewee or organisation be likened to any responses provided and the entire research process would be conducted in accordance with the University of Wolverhampton's ethical and safety guidelines for fieldwork. In return for your participation, the research findings and any tools developed from the study would be made available to you. The findings could have the potential to guide effective management of your supply chain members based on the outcomes targeted for a particular project. I am also willing to comply with any requirements or negotiate any terms that you may deem necessary in accordance with your company's regulations.

This research is being supervised by Dr Nii A. Ankrah, Dr Ezekiel Chinyio of University of Wolverhampton and Prof. David Proverbs of University of the West of England, Bristol, all of whom are accomplished researchers in the field of construction management. Attached to this letter is a short proposal about this research. Kindly indicate the willingness of your firm to participate in the research by completing and returning the contact person slip using the enclosed FREE POST return envelope. Alternatively, an e-mail can be sent to E.Manu@wlv.ac.uk providing details of a contact person with whom further correspondence can be made.

I look forward to obtaining a favourable response.

Yours faithfully,

Emmanuel Manu
Doctoral Research Student,
Tel: 01902321247 Mobile: 07735083823



CONSENT FORM

I understand that this interview is part of a research being undertaken by Mr. Emmanuel Manu of the School of Technology, University of Wolverhampton and under the supervision of Dr Nii A. Ankrah, Dr Ezekiel Chinyio and Professor David Proverbs.

I understand that the study aims to capture the influence of trust on performance of construction supply chain members and hence project outcomes and to explore how trust develops amongst construction supply chain members during project execution.

I understand that my participation is voluntary and that any information I provide would be kept confidential and used for research purposes only. I understand that at no time will my true identity be likened to any response provided as codes and pseudo names would be employed throughout.

To maintain a free flow of information and accuracy of records, I agree for the interview to be audio recorded for later transcription.

I understand that at any stage of the interview, I am free to terminate my participation if I so feel without having to provide any specific reason.

I understand the issues described above and agree to participate in this research.

Name of participant:

Date:

Signature:

INTERVIEW GUIDES



A

Interview guide (Supply Chain Manager)

SCM1. What position do you occupy in this organisation and what is your role?

SCM2. Does your organisation have a supply chain in place for your projects? What is the motivation behind your organisations supply chain? Provide a brief overview of your organisation's supply chain management policy and practice e.g. what does your supply chain management process entail?

SCM3. How do you keep firms that make up your supply chain motivated during periods of less or no work?

SCM4. During subcontractor procurement, how do you balance out the risk between your level of expectation in the standard of work and cooperation of a subcontractor on one hand, and the price for which they have offered to undertake the subcontract package on the other hand?

SCM5. On the project which has been made available for our case study investigation, could you provide an overview of the main criteria based on which major subcontract packages by value were procured? Were these subcontractors selected from amongst your regular supply chain or some are altogether new?

SCM6. What expectations do you have in subcontractors that get onto your supply chain? Do they have to sign up to any charter, alternative dispute resolution mechanisms etc.? Has any report been escalated to you from the case study project regarding subcontractors not meeting your expectations?

SCM7. How would you describe the approach/attitude of your organisation to paying subcontractors, resolving problems, sharing project information, performance measurement and reward schemes?

SCM8. How often do you have to use new subcontractors or freshen up your database? What are some of the challenges of using a new subcontractor that you are yet to build a relationship with? How are these challenges managed?

SCM9. Have any systems been implemented on the project to monitor how your expectation in the subcontractors change during the course of the project? Kindly provide details of these.

SCM10: In situations where your expectation in the standard of work or cooperation of a subcontractor is stretched to the limit due to emerging problems, how are these addressed?

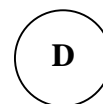
SCM11. Has your supply chain management practice influenced the kind of personnel you put on your projects and how the projects are managed? Has this influenced the level of supervision and monitoring for subcontractors on your projects?

SCM12. How has the current state of the economy influenced your supply chain management practices?

SCM13. Could you provide a brief overview of the benefits you have derived from your supply chain management practices so far?

SCM14. Could you provide an overview of some of the downfalls of your organisation's supply chain management system/practice? Is there any scope for improvement in your supply chain management practice? Provide details and specify examples if possible.

SCM15. Do you undertake any reviews with your supply chains where areas of continuous improvements are discussed and required assistance provided? Are there any mechanisms in place to ensure the best interest of subcontractors that make up your supply chain?



Interview guide (Main Contractor Project Team)

MC1. What is your role on this particular project and what position do you occupy in your organisation?

MC2. What expectations do you have of subcontractors on this project? Kindly provide an indication of the degree of such expectations e.g. very high, high, low, or moderate and explain why. Kindly provide some reasons for your claims.

MC3. Where would you say your expectation in the subcontractor firms emerge from/what underpins your expectations in subcontractors? Is it from the nature of relationship between the contact persons you deal with in the subcontracting firms or from your knowledge of the firm's commitment to high standards? How would your expectations change if key contact persons you deal with from these firms are replaced? Give any incidents to support your claims.

MC4. What underpins your expectation regarding the standard of work and contractual cooperation of subcontractors on this project? Do your gut-feelings play any role?

MC5. Has the expectation you have in the subcontractor firms regarding their standard of work or cooperation changed since the beginning of this project? Could you give explanations of why this change? Kindly provide any specific incidents to support your claims.

MC6. How variable are your expectations across the different subcontractors engaged on this project? Could you provide reasons for such variations? Could you contrast one firm you really trust in terms of any differences in your approaches for dealing with them and any associated outcomes?

MC7. Have any systems been implemented on this project to monitor how your expectation in their standard of work and cooperation changes during the course of this project? Kindly provide details of how any such systems are discharged.

MC8. Did these expectations in the standard of work or cooperation of subcontractors play any key role in the selection criteria for subcontractors on this project as against the price submitted for various subcontract packages? Give reasons to support your claims.

MC9. Have your expectations (either positive or negative) influenced the actions and behaviours that you have displayed especially when problems arise on the project? Are you compelled to undertake certain actions or exhibit certain behaviours based on the kind of relationship that you intend to develop or that you feel exists already? Are there any particular risks you have accepted or cooperative behaviours you have exhibited which would otherwise have been absent had it not been for your expectation in the subcontractor or the state of the relationship? Give any incidents to support your claims.

MC10. Do you feel that changes in your expectations have played any role so far on what has been achieved at this stage of the project or these achievements can mainly be attributed to strictness in supervision and the contractual framework for the project? Would your expectations in subcontractors influence what you intend to achieve for the remainder of the project? Explain with examples if possible.

MC11. Have your expectations (positive or negative) so far played any role in the level of supervision that you have put in place on the project? Have any specific management systems been implemented on this

project that is as a result of the state of relationship between you and the subcontractor firm? Kindly give specific incidents which support your claims.

MC12. Has the financial cooperation on this project been influenced by your expectations in the subcontractors and the state of the relationship? Do you always pay on time? Provide specific incidents to substantiate your claims.

MC13. Are there any aspects of the overall performance targets (KPI's) set out for this project that you would say has been influenced by your expectations and the state of relationships on the project? Give particular incidents to substantiate such claims if any. Could you contrast this with the influence that the contractual framework for this project has on the achievement of project objectives? Could project objectives still be achieved in the absence of the relationship that exists between you and the subcontracting firms on the project?

MC14. What influence does the current economic climate have on the trade-off between relationship-based and contractual approaches? Kindly give incidents to substantiate your claims.

MC15. What mechanisms have been put in place on this project to ensure the interest of subcontractors? In situations where your expectation in a subcontractor on this project is stretched to the limit due to emerging problems, how have these been addressed?

MC16. Are there any downfalls of your organisation's supply chain management system/practice? Elaborate on these. Is there any scope for improvement in your supply chain management practice? Is there any scope for improvement in how you manage your subcontractors at the project level? Elaborate with examples if possible.

Interview guide (Subcontractor)

SC1. What is your role on this particular project and what position do you occupy in your organisation?

SC2. Are you on supply chain database of the main contractor? Provide an overview of the benefits of being on their supply chain. Have you become a better/more competent subcontractor due to as a result of being on their supply chain or you working for this main contractor?

SC3. Have you had previous experience using similar contract forms that sought to promote the principles which are being promoted on this project? Are the teams which your organisation has put together for this project different from those you use on other projects?

SC4. What do you feel were the main reasons for which you were awarded this job? Do you feel that the main contractor's expectations in the standard of work or cooperation of your organisation played any key role in your selection for this project as against the price you submitted for the subcontract package? Give reasons to support your claims.

SC5. What expectations do you have regarding the commitment of the main contractor in looking out for your best interest on this project? Kindly provide an indication of the degree of such expectations e.g. very high, high, low, or moderate and explain why. Provide any examples.

SC6. Where would you say such expectations you have in the main contractor emerge from? How would your expectations change if key contact persons you deal with from the main contractor's organisation are replaced? Does your gut-feeling play any role? Provide examples if any.

SC7. Has your expectation (positive or negative) in the main contractor regarding their commitment to act in your best interest changed during the course of the project? Could you give explanations of why this change? Provide examples if any.

SC8. Has cooperation on payment and other financial matters on this project been reflective of the state of relationship between you and the main contractor? Do they always pay on time? Provide examples if any. Have payment terms changed as a result of problems that occurred on the project e.g. disagreement on valuations submitted, switching from lump sum to target cost etc?

SC9. Was your subcontract package let out on a lump sum or an activity schedule? How have you had to cope with any associated risks? How are retentions handled on the project?

SC10. Do you prioritise the subcontract enquiries when they come in? What kind of priority do you give to enquiries from this main contractor?

SC11. How would you describe your trust in the main contractor in terms of: Paying on time; resolving problems in a fair way; sharing project information; their subcontractor selection process; performance measurement and reward schemes, helping your business grow?

SC12. Do you undertake any performance ratings of the main contractors and do they also score your performance? Do you ask the main contractors to rate you to see if you are meeting their expectations? Provide an overview of these.

SC13. Have there been certain training and certification requirements that you have had to meet to become or remain on their supply chain database? Who bears the cost of these? Any assistance from the main contractors?

SC14. Do you feel that the expectations of the main contractor regarding your standard of work and cooperation (positive or negative) has so far played any role in the level of supervision that has been put in place on the project? Provide examples if any.

SC15. Have their approach towards you changed over the years especially since you began rising up their supply chain? Have you realised any changes to the way they scrutinize you? Do you feel they don't trust you when they over scrutinize you?

SC16. How have your own expectations (either positive or negative) and the state of relationship between you and the main contractor influenced the way you handle problems when they arise on this project? Provide examples if any.

SC17. Following a monthly review meeting on progress made on this project, would you say any achievements have been due to the main contractor's procedures or it has been down to how well they work with people? How much are such achievements down to the main contractor pushing you? Provide examples if any.

SC18. Have trust relationships between you and the main contractor influenced any performance goals (KPI's) on this project? Provide examples if any. Could KPI's be achieved by the main contractor just pushing you?

SC19. How does this particular contractor compare/differ from other employers you work for on other projects? How much do you like working for this particular main contractor?

SC20. What happens when there is little or no work with this main contractor? How do they stay in touch with you and how do they keep you motivated as part of their supply chain?

SC21. Is there any scope for improvements in the way the main contractor manages their supply chain? Any suggestions for improvements? Provide an overview if any.

**PROJECT DATA SHEET****B****NAME OF PROJECT:****DATE:**

1. What is the nature of the majority of work involved in this project?			
New work	<input type="checkbox"/>	Refurbishment	<input type="checkbox"/>
Redevelopment	<input type="checkbox"/>		Fit-out <input type="checkbox"/>
2. Which category does the client belong?			
Public	<input type="checkbox"/>	Private	<input type="checkbox"/>
		Quasi-government	<input type="checkbox"/>
3. How was your organisation selected for this project?			
Open tender	<input type="checkbox"/>	Selective tender	<input type="checkbox"/>
Two-stage tender	<input type="checkbox"/>	Other, Specify:	<input type="checkbox"/>
4. What is the proposed duration of this project?			
Under 12months	<input type="checkbox"/>	12 – 24 months	<input type="checkbox"/>
Over 36 months	<input type="checkbox"/>	25 – 36 months	<input type="checkbox"/>
5. Assuming the project is divided into three phases in terms of percentage completed, kindly specify the phase which best describes the current stage of this project?			
Start-up phase (less than 30%)	<input type="checkbox"/>	Advanced (30%-70%)	<input type="checkbox"/>
Near close-out (greater than 70%)	<input type="checkbox"/>		
6. Which of the following best describes the procurement arrangement adopted for this project?			
Design & Build	<input type="checkbox"/>	Prime contracting	<input type="checkbox"/>
Turnkey/Package deal	<input type="checkbox"/>	Traditional design-bid-build	<input type="checkbox"/>
Management contracting	<input type="checkbox"/>	Construction management	<input type="checkbox"/>
PFI/BOOT/BOT	<input type="checkbox"/>	Partnering	<input type="checkbox"/>
Other, Specify:	_____		
7. Which contract form is being used for this project?			
NEC Contracts	<input type="checkbox"/>	JCT Contracts	<input type="checkbox"/>
ICE Contracts	<input type="checkbox"/>	FIDIC Contracts	<input type="checkbox"/>
		PPC Contracts	<input type="checkbox"/>
		Other, Specify	_____
8. Kindly specify the category which best describes the contract sum of this project at award.			
Under £10 million	<input type="checkbox"/>	£10 – £30 million	<input type="checkbox"/>
£31 - £70 million	<input type="checkbox"/>	Over £70 million	<input type="checkbox"/>



SUBCONTRACTOR INFORMATION SHEET

NAME OF PROJECT:

DATE:

Kindly provide details of a key subcontractor based on package value and work content who will be willing to assist in this research. Consider if on site or to be awarded.

Name of firm: _____

Subcontractor details

1. Main contact: _____
 Position: _____
 Telephone: _____
 E-mail: _____

2. Second contact: _____
 Position: _____
 Telephone: _____
 E-mail: _____

Package description: _____

Order date (if applicable): _____

Prestart meeting date (if applicable): _____

Start on site: _____

Completion date: _____

Site management staff of subcontractor

1. Name: _____
 Position: _____
 Contact details: _____

2. Name: _____
 Position: _____
 Contact details: _____

Main contractor's site manager

Are monthly progress meetings expected? Yes ☐ No ☐

Upcoming dates for monthly progress review or project walk around meetings:

Provide details of any key issues to be aware of: _____

APPENDIX C: DATA ANALYSIS OUTPUTS

Appendix C1: Thematic Maps for Strategic SCM Practices

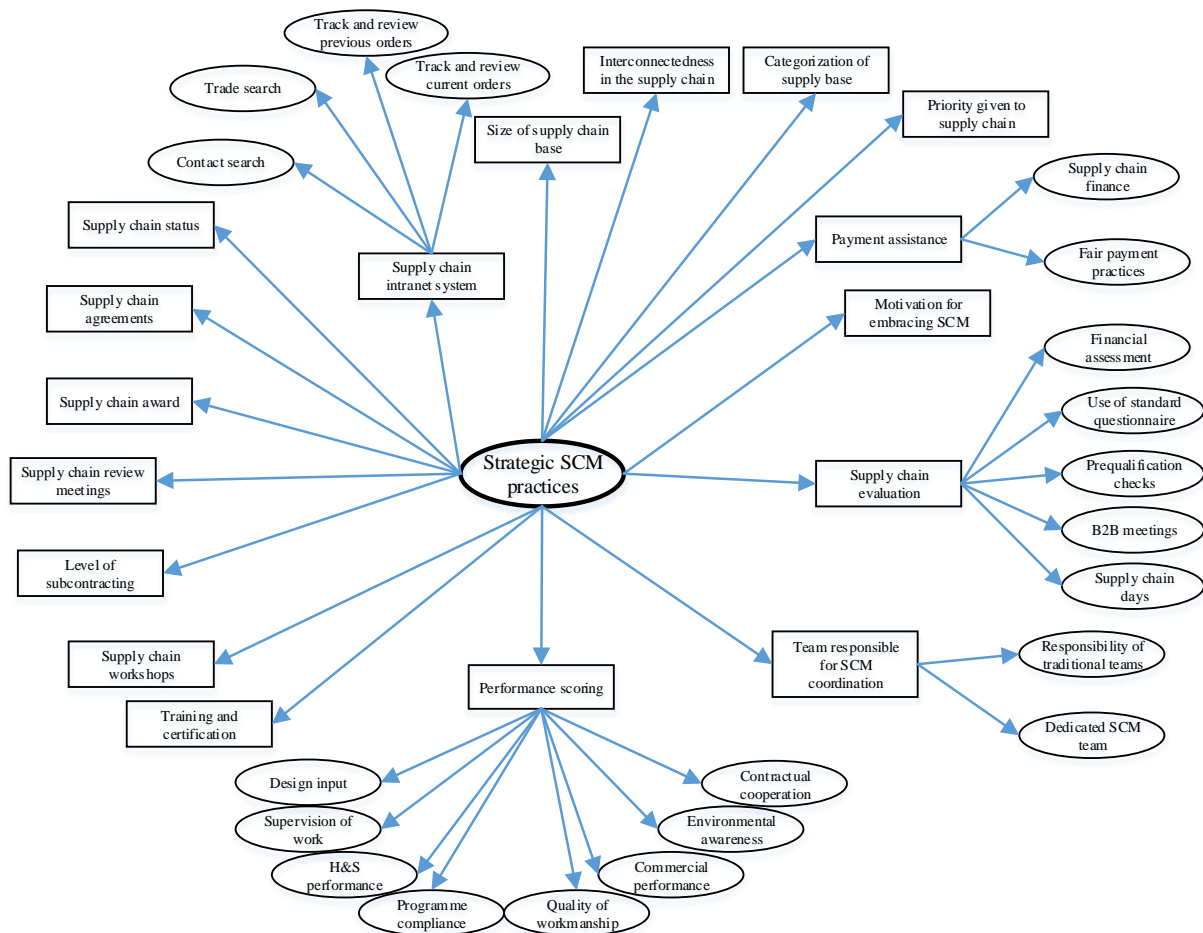


Figure 1: Initial thematic map on strategic SCM practices of main contractors

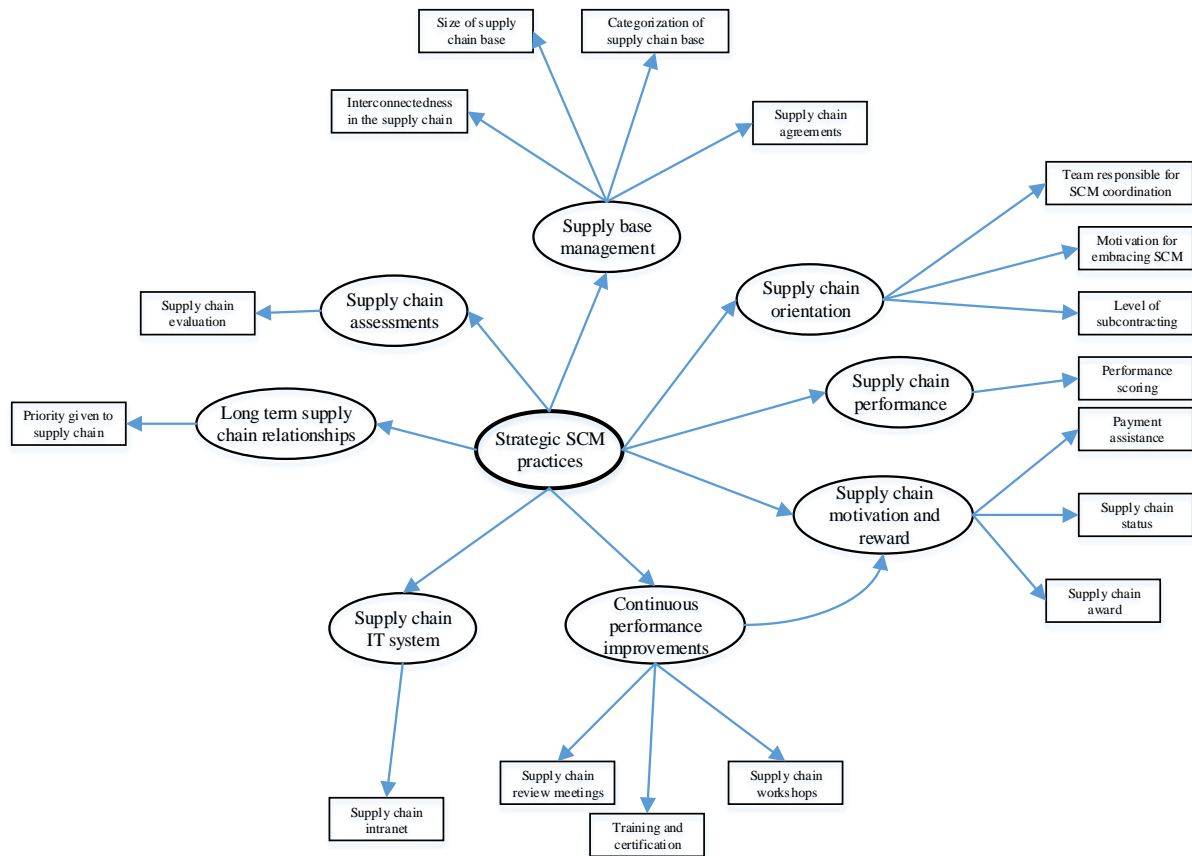


Figure 2: Final thematic map on strategic SCM practices of main contractors

Appendix C2: Matrix Coding Queries Output from Nvivo 9

Table 1: Supply chain management practices across the four cases

	A : Case study Alpha	B : Case study Beta	C : Case study Gamma	D : Case study Delta
1 : Continuous performance improvt.	18	22	18	18
2 : Long-term relationships	9	4	22	6
3 : Supply base management	12	14	17	17
4 : Supply chain assessments	13	13	17	9
5 : Supply chain IT system	31	18	24	15
6 : Supply chain motivation and reward	21	11	10	13
7 : Supply chain orientation	1	2	1	6
8 : Supply chain performance scoring	22	19	38	13

2: Manifestation of Trust in the Main Contractor's Supply Chain

Table 2a: Meaning of trust from main contractor and subcontractor perspectives

	A : Main contractor	B : Subcontractor
1 : Competence	53	62
2 : Fair and reasonable treatment	16	52
3 : Familiarity	20	28
4 : Honesty and integrity	16	42
5 : Openness	13	30
6 : Reliance for help	14	17
7 : Reputation	1	10

Table 2b: Meaning of trust across four cases

	A : Case study Alpha	B : Case study Beta	C : Case study Gamma	D : Case study Delta
1 : Competence	44	30	20	21
2 : Fair and reasonable treatment	31	10	13	14
3 : Familiarity	11	16	6	15
4 : Honesty and integrity	21	15	4	18
5 : Openness	27	2	2	12
6 : Reliance for help	17	7	1	6
7 : Reputation	6	0	2	3

Table 2c: Meaning of trust from all perspectives against trust dimensions

	A : Cognition-based trust	B : Relational-based trust	C : System-based trust
1 : Competence	12	13	3
2 : Fair and reasonable treatment	1	7	3
3 : Familiarity	3	13	2
4 : Honesty and integrity	3	10	3
5 : Openness	0	6	2
6 : Reliance for help	1	6	1
7 : Reputation	0	0	0

Table 2d: Main contractor supply chain management practices against trust dimensions

	A : Cognition-based trust	B : Relational-based trust	C : System-based trust
1 : Continuous performance improvt.	2	6	25
2 : Long-term relationships	1	23	3
3 : Supply base management	1	3	5
4 : Supply chain assessments	25	1	4
5 : Supply chain IT system	16	5	5
6 : Supply chain motivation and reward	0	5	2
7 : Supply chain orientation	1	2	1
8 : Supply chain performance scoring	5	1	2

3: Factors that Influenced Trust Dynamics in the MC's Supply Chain

Table 3a: Factors that influenced trust dynamics from main contractor and subcontractor perspectives

	A : Main contractor	B : Subcontractor
1 : Change management	47	112
2 : Economic climate	73	64
3 : Job performance	52	108
4 : Payments issues	52	120
5 : Perceived opportunity for future work	71	92
6 : Project specific circumstances	17	11

Table 3b: Factors that influenced trust dynamics in the supply chain against dimensions of trust

	A : Cognition-based trust	B : Relational-based trust	C : System-based trust
1 : Change management	4	26	5
2 : Economic climate	3	4	2
3 : Job performance	3	19	6
4 : Payments issues	3	10	4
5 : Perceived opportunity for future work	18	17	8
6 : Project specific circumstances	11	1	0

Table 3c: Factors that influenced trust dynamics against meaning of trust from main contractor and subcontractor perspectives

	A : Change management	B : Economic climate	C : Job performance	D : Payments issues	E : Perceived opportunity for future work	F : Project specific circumstances
1 : Competence	3	9	13	4	11	0
2 : Fair and reasonable treatment	18	4	8	25	1	0
3 : Familiarity	3	4	3	6	5	0
4 : Honesty and integrity	17	1	14	17	4	0
5 : Openness	5	1	38	1	1	1
6 : Reliance for help	2	2	2	2	6	0
7 : Reputation	0	1	1	2	0	0

4: Functional Consequences of Trust in the Supply Chain

Table 4a: Behavioural consequences of trust against trust dimensions

	A : Cognition-based trust	B : Relational-based trust	C : System-based trust
1 : Effective knowledge sharing	3	6	1
2 : Extra commitment	3	18	2
3 : Relational flexibility	9	43	9
4 : Self organising behaviour	2	3	3

Table 4b: Behavioural consequences of trust that manifest across cases

	A : Case study Alpha	B : Case study Beta	C : Case study Gamma	D : Case study Delta
1 : Effective knowledge sharing	43	10	11	19
2 : Extra commitment	58	27	19	31
3 : Relational flexibility	79	57	18	37
4 : Self organising behaviour	16	10	15	11

Table 4c: Project performance consequences against trust dimensions

	A : Cognition-based trust	B : Relational-based trust	C : System-based trust
1 : Cost performance	9	18	2
2 : Health and safety performance	5	7	22
3 : Programme compliance	0	17	2
4 : Quality of workmanship	5	4	3

Table 4d: Project performance consequences across cases

	A : Case study Alpha	B : Case study Beta	C : Case study Gamma	D : Case study Delta
1 : Cost performance	69	33	18	20
2 : Health & safety performance	27	48	9	15
3 : Programme compliance	56	16	0	16
4 : Quality of workmanship	26	17	4	20

Table 4e: Behavioural consequences of trust against project performance consequences

	A : Effective knowledge sharing	B : Extra commitment	C : Relational flexibility	D : Self organising behaviour
1 : Cost performance	8	12	26	2
2 : Health and safety performance	0	4	7	8
3 : Programme compliance	1	3	22	2
4 : Quality of workmanship	1	4	10	5

Appendix C3: Thematic Conceptual Matrices Across Cases

Table 1: Cross-case comparison of main contractor supply chain management practices

	Alpha	Beta	Gamma	Delta
Supply chain orientation	<ul style="list-style-type: none"> To reward contractors who perform well with more work, and to reduce opportunities for contractors to perform badly on projects. Subcontract about 90% of workload annually Coordinated by a supply chain manager 	<ul style="list-style-type: none"> To promote repeat business with same contractors so as to achieve better performance Subcontract 70-80% of workload annually No specific person designated to manage the supply chain as this is now an added responsibility of the commercial team. 	<ul style="list-style-type: none"> Develop stronger, closer and collaborative relationship with fewer SCs that fit into their various initiatives. 30% of work subcontracted due to a transition towards in-house delivery. Coordinated by a procurement leader 	<ul style="list-style-type: none"> Subcontracts approximately 80% of workload annually To give well known and trusted contractors more opportunity to secure work. Supply chain activities coordinated by a procurement manager.
Supply base management (size, connectedness and classification)	<ul style="list-style-type: none"> Approximately 5000 SCs used per year nationally. Large supply chain base with classification of supply chain into four categories. Well-structured with allocation of contact persons to each SC SCs well informed of their status on the supply chain at any given point. High level of connectedness with top category SCs. Level of connectedness decreases further down the categories 	<ul style="list-style-type: none"> Regionalized supply chain with approximately 150 SCs Small-sized supply base with a four tiered classification system where SCs are either categorised as platinum, gold, silver or bronze. SCs not explicitly informed of their status on the supply chain. Low levels of connectedness with their supply chain. 	<ul style="list-style-type: none"> Approximately 2500 SCs used nationally Four tiered categorization structure which is highly flexible with last tier being a temporary tier for SCs that are used on one-off basis. Status of SCs on supply chain base not used to promote competition High degree of connectedness with three main tiers backed by subcontract agreements with SCs on these top three categories 	<ul style="list-style-type: none"> Approximately 10,000 registered SCs on database with some degree of SC connectedness. Large but fairly stable supply chain base with three levels of classification (strategic, preferred and general registered). SC status on database is not explicitly made known to them
Supply chain assessments	<ul style="list-style-type: none"> Supply chain interviews and audits on H&S, design, employment policy, financial stability and contract terms. 	<ul style="list-style-type: none"> Assessment through a standard SC questionnaire Obtain the necessary references. 	<ul style="list-style-type: none"> Completion of online forms and invitation to interviews. Visits to SC premises Further checks such as SSIP checks, Dunn and Bradstreet's 	<ul style="list-style-type: none"> Supply chain interviews and collection of necessary references. Transition to B2B interviews with potential SCs.

	Alpha	Beta	Gamma	Delta
	<ul style="list-style-type: none"> Collection of necessary references, commercial checks and office visits where necessary. 	<ul style="list-style-type: none"> Audit of company registration numbers, VAT numbers, CITB, type of order value they do, H&S advisors, insurance details, levels of insurance, trade federation membership relationship. 	<ul style="list-style-type: none"> financial assessments to verify financial and credit rating Assessments of how firms can contribute to the DFMA agenda. 	<ul style="list-style-type: none"> Health checks to ensure that the SC understands the vision they want to realise.
Long-term relationships	<ul style="list-style-type: none"> Approximately 50% of subcontract orders placed with top category SCs nationally Formal long-term subcontract agreement signed with only category one SC's. 	<ul style="list-style-type: none"> Approximately 40% of workload awarded to platinum [Highest ranked] SCs annually 	<ul style="list-style-type: none"> 99% of opportunities go to regular SCs on the supply chain 	<ul style="list-style-type: none"> 50% of subcontract orders annually placed with strategic and preferred SCs. Long-term relationships with strategic and preferred SCs
Supply chain performance	<ul style="list-style-type: none"> Performance scoring on H&S, standard of work, compliance with programme, contractual cooperation, financial cooperation, supervision of work and design input where applicable. H&S scorings revealed and discussed with all SCs on the project whilst other scores are only revealed and discussed with category one SC's. Performance scores are continuously updated on IT system 	<ul style="list-style-type: none"> Monthly scoring on quality of work and H&S that are discussed with SCs Close-out scoring on performance to specification, performance to programme, office support and general helpfulness, contractual financial attitude, environmental awareness and safety performance. Weighted scores are entered onto supply chain IT system Ratings are not discussed with SCs but they are also given the opportunity to score project team's performance. 	<ul style="list-style-type: none"> Performance scoring jointly undertaken by project team on monthly basis. Scores are designed to identify low and high performers hence the avoidance of a middle score. No performance scoring opportunity for SCs. Performance scoring only discussed with SCs when outcome is poor. 	<ul style="list-style-type: none"> Performance scoring undertaken by project manager Performance scoring comprising 20 questions on H&S, quality and other aspects of SC performance. Opportunity to provide additional comments to explain any specific issues on SC performance. SCs are given the opportunity to rate the project team's performance at the end of the project. Performance scores not actively discussed with SCs except when needed.

	Alpha	Beta	Gamma	Delta
Information Technology	<ul style="list-style-type: none"> • <i>Bespoke easy to use IT system developed by in-house team.</i> • <i>Holds SC trading information, supply chain status, project preferences, SC performance scores and supports e-tendering.</i> • <i>Holds details of key contact person for each SC on the database</i> 	<ul style="list-style-type: none"> • <i>Extensive SC and material supply lotus notes database that is held on a central server</i> • <i>Holds performance scores and relevant SC information.</i> • <i>Unable to track live concurrent workloads being undertaken by a single SC.</i> 	<ul style="list-style-type: none"> • <i>Proprietary IT system that is considered by project team as non-user friendly</i> • <i>Holds information on SC performance and relevant SC documentation.</i> • <i>Limited functionality for supporting SC selection due to inability to track SC performance scores.</i> 	<ul style="list-style-type: none"> • <i>Bespoke IT database system</i> • <i>Holds information on SC performance spending levels and key contacts.</i>
Continuous performance improvements	<ul style="list-style-type: none"> • <i>Annual review meetings with category one SCs to discuss performance, set improvement areas, air both positive and negative aspects of the agreement and develop greater understanding and trust with SCs through improved communication.</i> • <i>Allocation of contact person to each SC.</i> 	<ul style="list-style-type: none"> • <i>Ad hoc as against formalised or structured meetings to engage with SCs and discuss progress and performance improvement targets.</i> • <i>In-house H&S training and certification for SCs.</i> 	<ul style="list-style-type: none"> • <i>Organises workshops, visits to off-site manufacturing facility and innovation days to discuss latest innovation e.g. using phone apps to identify and report defects.</i> 	<ul style="list-style-type: none"> • <i>Supervisor training initiatives for strategic and preferred SCs especially on H&S</i> • <i>Allocation of key contact to each SC to meet at least twice a year and discuss avenues for improvement and progress with relationship.</i> • <i>With these efforts, emphasis is placed on preferred and strategic SCs.</i>
Supply Chain Motivation and Reward	<ul style="list-style-type: none"> • <i>Annual best performing SC award.</i> • <i>Tendering priority based on SCs supply chain status.</i> • <i>30 days payment arrangement.</i> 	<ul style="list-style-type: none"> • <i>Monthly supply chain awards especially for health and safety performance.</i> • <i>Opportunity to discuss and continuously tender for future work on ad hoc basis.</i> • <i>35 days payment arrangement which was met 80% of the time.</i> 	<ul style="list-style-type: none"> • <i>45 days payment arrangement with SCs which is always adhered to</i> • <i>Quarterly meeting with tier one and two SCs to discuss pipeline of work which was part of responsibility of procurement leader and his team.</i> 	<ul style="list-style-type: none"> • <i>Continuity of work for strategic and preferred SCs.</i> • <i>35 days payment arrangement which met 95% of the time.</i> • <i>Early payment for discount scheme</i> • <i>Assisting SCs to develop, diversify and expand their business</i>

	Alpha	Beta	Gamma	Delta
				<ul style="list-style-type: none"> • <i>Directors engage with SCs to talk and discuss further work opportunities</i>

Abbreviations as follows: B2B: business-to-business; CITB: construction industry training board; DFMA: design for manufacture and assembly; H&S: health and safety; IT: information technology; SSIP: safety schemes in procurement; SC: subcontractor; VAT: value added tax.

Table 2: Cross-case comparison of trust attributes from main contractor perspectives

Trust attributes	Alpha	Beta	Gamma	Delta
Familiarity	<i>“those who have a relationship with us that has developed over a number of years”</i>	<i>“those that you know you already have a relationship with” “people that we have been using quite regularly”</i>	<i>“a proven track record with our business, people I’ve already got a relationship with and I know I can trust”</i>	<i>“people I have used before that I know I can trust and know what to expect”</i>
Competence	<i>“they need to be competent”</i>	<i>“those who’ll turn out a high quality of work”</i>	<i>“competent specialists for each particular package from our tiered supply chain”</i>	<i>“somebody I can trust and rely on that you can give them a set of work and all you’ve got to do is you can do a few checks on them, you’re not looking after them all the time”</i>
Reliance for help	<i>“value engineering assistance and programme guidance” “helps us to win work by providing us with better quality tenders”</i>	<i>“people that are more likely to help you out of a problem”</i>	<i>“people who can support our DFMA agenda and the work winning side of things”</i>	<i>“going above and beyond, getting involved and trying to help us out”</i>
Openness				<i>“because of the way we operate, honesty and openness, ok, we were too busy, we shouldn’t have taken it on”</i>
Reputation			<i>“they’ve got financial stability”</i>	<i>“reputable companies as that gives you that bit of confidence because they’ve got their reputations to think of as well”</i>
Fair and reasonable treatment				
Honesty and integrity	<i>“that they would not exercise their opportunity on variations or something”</i>		<i>“give right answers in the pre-contract meeting and you get the feeling they are telling the truth”</i>	<i>“honesty where subcontractors would come to us and admit to a defect and we’ll look at it and how we’re going to deal with that”</i>

Abbreviations as follows: DFMA: design for manufacture and assembly

Table 3: Cross-case comparison of trust attributes from subcontractor perspectives

Trust attributes	Alpha	Beta	Gamma	Delta
Familiarity	<i>“top of our list for trust, definitely just ‘cos we’ve worked with them for so long, so we know so many people within the company”</i>	<i>“knowing how the company work once you’ve dealt with them one or two times”</i>	<i>“companies that make us part of their team”</i>	<i>“Those who are used to how we work and understand that our systems are quite rigorous and everything is in place”</i>
Competence		<i>“a company that runs an efficient job”</i>	<i>“companies that organise their project site very well”</i>	
Reliance for help	<i>“looking out for us in terms of work opportunity”</i>	<i>“it’s all about repeat business so a company that looks out for us as a business so we can keep getting enquiries and jobs”</i>	<i>“if he trusts me and I trust him, I can go to him on next job and say ‘you can trust me, ‘cos you trusted me on last one”</i>	<i>“give us the opportunity to get on the tender list for another project”</i>
Openness	<i>“Open and frank discussions whenever there is a problem”</i>	<i>“company that creates an environment where if there’s a hiccup, it’s easy to pick up the phone, call or drop in, discuss it and come to a resolution”</i>	<i>“I’ve got to trust him that he’s given me proper information and not holding a load back to just try and hit me with a stick.” “If I’ve got a problem, I can go and talk to them”</i>	
Reputation	<i>“bigger contractors who’ve got the money and cannot easily go burst”</i>	<i>“a company that is well known in case they go bankrupt because if they go bankrupt I’m going to loose a lot of money”</i>	<i>“I’ll only go for premier league, I wouldn’t price a job for championship. Well, you don’t know whether you’re gonna get paid”</i>	
Fair and reasonable treatment	<i>“Understanding and being fair with extras” “being fair with the monetary, commercial side of things” “pay us on time when we put our applications in”</i>	<i>“I think if they treat me fairly, and I get a good percentage of work I price” “being dealt with fairly and being paid on time”</i>	<i>“I’ve got to trust him that he’s not just gonna put somebody in there who’s just gonna make life hell for me but is fair and reasonable”</i>	<i>“that we are paid on time, as per our valuations, and we’re not on extended payment terms”</i>
Honesty and integrity	<i>“I trust them because they’ll honestly expose me about their situation and say ‘we’ve only got budgets for this, this and this”</i>	<i>“contractors that will not try and get you to do extra works without intending to pay you for it” “good payers, prompt payers”</i>	<i>“that on day 45 my money will be in the bank” “I’ve got to trust him that once I’ve done all that, he’s gonna pay me on time”</i>	<i>“Being given what we were promised so there’s no sort of hidden costs and charges for us doing works”</i>

Table 4: Cross-case comparison of factors that influence trust from main contractor perspectives

Factors	Alpha	Beta	Gamma	Delta
Change management	<ul style="list-style-type: none"> • <i>Incomplete design and nature of the project resulted in numerous variations</i> • <i>Day-works could not always be avoided although this was often a source of disagreements</i> • <i>Formal procedures for managing change could not always be adhered to.</i> • <i>Particular trades were more prone to variations which had to be carefully managed to prevent escalation</i> 	<ul style="list-style-type: none"> • <i>Poor detailing and drawing coordination resulted in changes to work scope</i> • <i>Changes had to be carefully managed to avoid escalations that could degrade trust</i> 	<ul style="list-style-type: none"> • <i>Risky and highly variable work packages self-delivered</i> 	<ul style="list-style-type: none"> • <i>Ensuring that SCs were fairly paid for any changes.</i> • <i>Disagreements on claims were quickly discussed with SCs to avoid any delays.</i> • <i>Proactive attitude to managing change limited the number of issues that cropped up.</i> <p><i>Confidence in the change management process was demonstrated by SCs.</i></p>
Economic climate	<ul style="list-style-type: none"> • <i>Increased opportunity to use new SCs based on weaker (cognition-based) trust</i> • <i>Higher risk of SCs going bankrupt and the need for rigorous financial assessments</i> 	<ul style="list-style-type: none"> • <i>High tendency for firms to go into administration</i> • <i>Tight margins for which cheaper subcontractors have to be used</i> • <i>Occasional failure of subcontractor during the project for which regular subcontractor is brought on board at an extra cost</i> 	<ul style="list-style-type: none"> • <i>Added value to clients through innovation, self-delivery so as to win enough projects for supply chain workflow.</i> • <i>Ease of getting good SCs on a job due to competent SC availability.</i> • <i>Increased tendency for SCs to go into administration with an occurrence during the project.</i> 	<ul style="list-style-type: none"> • <i>Highly competitive market where commercial factors dictate final decisions.</i> • <i>Market testing prices to ensure that prices from supply chain SCs were not overboard.</i> • <i>High tendency for SCs to go into liquidation.</i> • <i>Rigorous financial checks and continuous monitoring of financial situation of SCs.</i> • <i>Critical evaluation of invoices during project.</i>
Payment issues	<ul style="list-style-type: none"> • <i>Prompt payment of SCs in accordance with 30 days payment policy</i> • <i>Difficulty in reaching agreements on payment especially with highly variable trades</i> 	<ul style="list-style-type: none"> • <i>Ensuring that SCs are paid according to 35 days payment arrangement which is not always possible</i> 	<ul style="list-style-type: none"> • <i>Strict adherence to 45 days payment arrangement</i> 	<ul style="list-style-type: none"> • <i>Recognition that cash flow is the most important consideration for SCs.</i> • <i>Ensuring that SCs are paid according to 35 days payment policy or even earlier.</i>

Factors	Alpha	Beta	Gamma	Delta
				<i>Payment practices used as part of SCM strategy to build trust with SCs.</i>
Project specific context	<ul style="list-style-type: none"> • <i>Selection of some local and unknown SCs due to client requirement</i> • <i>Tight budget and programme and nature of project presented challenges</i> 	<ul style="list-style-type: none"> • <i>Negotiated project that made it commercially flexible to bring back some top category SCs</i> 	<ul style="list-style-type: none"> • <i>PFI scheme facilitated repeated use of SCs.</i> • <i>Facilitated promotion of relational-based trust</i> 	<ul style="list-style-type: none"> • <i>Used regular SCs especially on major and highly specialist work packages</i>
Job performance	<ul style="list-style-type: none"> • <i>Tendency for complacency with regular SCs</i> • <i>Market testing prices to ensure commercial competitiveness of regular SCs</i> • <i>Tracking existing SC workload to avoid over allocation of work</i> • <i>Performance scoring to keep track of current performance</i> • <i>Sending out clear messages that no SC is guaranteed any work</i> 	<ul style="list-style-type: none"> • <i>Failure of regular and well trusted SCs during a project due to changes in their business</i> • <i>Failure to track work-overload which could potentially cause poor performance and hence trust breakdown.</i> 	<ul style="list-style-type: none"> • <i>Promptness in attending to performance queries a desirable attitude.</i> • <i>Drop in performance due to SCs change of management.</i> • <i>Increase in supervision to ensure achievement of performance targets</i> 	<ul style="list-style-type: none"> • <i>Most concerned about SCs providing a high quality of service and complying with the programme.</i> • <i>High level of job performance contributes to high trust in SC.</i> • <i>Task dependent as extra supervision was provided when SC became new to a task.</i>
Perceived opportunity for future work	<ul style="list-style-type: none"> • <i>SCs with higher expectations of future work prepared to accept more vulnerability during the project</i> • <i>Giving future work opportunity to highest category SCs</i> 	<ul style="list-style-type: none"> • <i>High perceptions of future work opportunities contributes to trust development</i> • <i>Inability to properly manage future job expectations of some flagship SCs.</i> 	<ul style="list-style-type: none"> • <i>High expectation of future work due to repetitive nature of BSF series of projects.</i> 	<ul style="list-style-type: none"> • <i>Client influence on SC selection process.</i> • <i>Unknown SCs that were recommended by client or selected from local area made trust more cognitive.</i> • <i>Lengthy process of evaluating unknown SCs in addition to closer monitoring.</i> • <i>One-off and highly specialist project that required use of specialists that had delivered similar project in the past.</i>

Abbreviations as follows: BSF: building schools for the future, PFI: private finance initiative, SCs: subcontractors

Table 5: Cross-case comparison of factors that influence trust from subcontractor perspectives

Factors	Alpha	Beta	Gamma	Delta
Change management	<ul style="list-style-type: none"> Complexity of the project presented a major challenge for change management especially for particular trades Trust was easier to maintain with the site management team as opposed to the commercial team Project team were not always open about anticipated changes to scope of work during initial negotiations 	<ul style="list-style-type: none"> Project team sometimes felt claims for extra work went overboard 	<ul style="list-style-type: none"> Entry and exit price usually same or at most 5-10% different Positive reinforcement of trust due to assurance that changes would be fairly managed. 	<ul style="list-style-type: none"> Keeping accurate records on changes which was a tedious accounting exercise. Project team even made additions where some figures were skipped. Proactive attitude of project team to managing changes positively reinforced trust.
Economic climate	<ul style="list-style-type: none"> Cash flow challenges due to lower margins Increased tendency of bankruptcy if cash flow difficulties are not properly managed 	<ul style="list-style-type: none"> High tendency for project team to select unknown SCs in current market Frequent recall of regular SCs due to unknown SC failure during the project 	<ul style="list-style-type: none"> Increased commercial emphasis which minimizes the role that relational trust previously played in the supply chain prior to the recession. 	<ul style="list-style-type: none"> Highly competitive market where commercial factors dictate final decisions. Being highly competitive to avoid sending signal to project team that pricing is unfair.
Payment issues	<ul style="list-style-type: none"> Satisfaction with payment policy and promptness of payment in most instances Delays with aspects of payments due to disagreements and on-going negotiation of valuations Delays with release of retention which have to be chased up or traded-off during negotiations 	<ul style="list-style-type: none"> Delayed payments which contribute to trust breakdown Follow ups with payment department three days earlier to ensure prompt payment Delays in retention release which are sometimes traded-off during negotiations. 	<ul style="list-style-type: none"> Satisfaction with promptness of payment in accordance with 45 days agreement. High level of trust with regards to promptness of payment during project. Delay in retention repayments after defects liability period. 	<ul style="list-style-type: none"> Satisfaction with the project team's promptness with payments. Exemption from retention deductions due to high trust. Prompt payment of retention deductions for previous projects completed. Payment practices reflect high trust in Delta.
Project specific context	<ul style="list-style-type: none"> Tight budget and programme which presented challenges for change management and agreement on payment. 	<ul style="list-style-type: none"> A better project which enabled several other SCs to be brought back on board 		

Factors	Alpha	Beta	Gamma	Delta
Job performance	<ul style="list-style-type: none"> • <i>Keenness to perform satisfactorily on the project to continuously reaffirm supply chain status</i> 	<ul style="list-style-type: none"> • <i>Performance on every single job so as to maintain trust.</i> • <i>Maintaining frequent unsolicited updates with project team to demonstrate job performance capabilities.</i> 	<ul style="list-style-type: none"> • <i>Desire to always meet performance target so as to maintain supply chain relationship.</i> 	<ul style="list-style-type: none"> • <i>Demonstrating high level of performance the most important factor to building trust.</i> • <i>Providing the project team with regular updates that keeps them informed.</i> • <i>Working hard to meet update of work plans that is communicated to project team.</i>
Perceived opportunity for future work	<ul style="list-style-type: none"> • <i>Acceptance of vulnerability based on perceptions of future work opportunity and offering extra assistance based on future expectations.</i> • <i>Occasional feeling of betrayal when expectations of future work do not materialise.</i> 	<ul style="list-style-type: none"> • <i>Lack of work winning for considerable period communicates a feeling of untruthful estimates</i> • <i>Considerable period of pricing work without winning results in trust breakdown.</i> • <i>High perceptions of future work opportunity fosters behaviours that are trust enabling.</i> 	<ul style="list-style-type: none"> • <i>High positive outlook of future work that derived from the very repetitive nature of the BSF scheme.</i> • <i>Contributed to higher perceptions of trust as long as performance was achieved.</i> • <i>Non-award of future work on BSF scheme after high performance managed through effective communication</i> 	<ul style="list-style-type: none"> • <i>High expectation of being rewarded on future project once high performance was demonstrated.</i> • <i>Demolition SC had already won another project after success on this project.</i> • <i>High expectation influenced demonstration of trust building behaviours.</i>

Abbreviations as follows: BSF: building schools for the future, PFI: private finance initiative, SCs: subcontractors

Table 7: Cross-case comparison of functional consequences of trust from main contractor perspectives

Behavioural consequences	Alpha	Beta	Gamma	Delta
Effective knowledge sharing	<ul style="list-style-type: none"> Value engineering and alternative working practices suggested by all SCs throughout the project irrespective of the nature of trust 	<ul style="list-style-type: none"> Willingness to make value engineering inputs during the project even when trust was cognitive in nature. Contributed to improvements in quality and cost performance of the project. 	<ul style="list-style-type: none"> All SCs shared as much knowledge towards achievement of project objectives. 	<ul style="list-style-type: none"> Regular and new SCs made inputs to improve cost, quality and make time savings. Satisfaction with value engineering inputs of regular and new SCs.
Self-organisation	<ul style="list-style-type: none"> Self-management capabilities demonstrated by all SCs which contributed to satisfactory achievement of quality and H&S performance Focus on self-management capabilities during vetting and pre-start meetings 	<ul style="list-style-type: none"> Poorly coordinated SCM practices inhibit development of cognition-based trust. Inability of SCs self-manage work as this did not dominate cognitive-based assessments. Highly reliant on supervision to ensure performance of most SCs. Established learning curve with system and relational-based trust System and relational-based trust promoted self-management opportunities. 	<ul style="list-style-type: none"> Self-management by SCs with oversight checking from project team. Rigorous evaluations during pre-start meetings to ensure that SCs can self-manage their works. Reliance on advice from highly specialist SCs. 	<ul style="list-style-type: none"> Only one works foreman for the £13 million project. SCs mainly required to manage their works due to its specialist nature. SCs both regular and new displayed high competence that was consistent with initial expectations. More spot checks undertaken when SCs were unknown. SCs were self-organised when trust was cognition, system and relational-based. High competence was with regards to H&S and quality performance.
Relational flexibility	<ul style="list-style-type: none"> Relational-based trust and Informality with work packages that are highly subject to changes Relational-based trust and Informality with work packages that are very complex and critical to the project success 	<ul style="list-style-type: none"> Less formality and infrequent M&E meetings due to relational-based trust at the interpersonal level. 	<ul style="list-style-type: none"> Emergence of informality when trust was more relational in nature. Informality attributed to previous relationships on other BSF projects. 	<ul style="list-style-type: none"> More relaxed atmosphere due to informality when trust is relational Informality and flexibility task-specific.

Behavioural consequences	Alpha	Beta	Gamma	Delta
Extra commitment	<ul style="list-style-type: none"> • <i>Exclusive help from regular SCs with regards to tendering assistance.</i> • <i>Request for specific supervisors to be on the job.</i> 	<ul style="list-style-type: none"> • <i>Maintain a core of these highly trusted supply chain firms as they are backbone of the business.</i> 	<ul style="list-style-type: none"> • <i>Support for the realisation of DFMA agenda during projects when trust is highly relational.</i> • <i>Specific request for SC personnel that had helped to achieve success on other BSF projects.</i> 	<ul style="list-style-type: none"> • <i>Extra commitment to work opportunity for preferred and strategic SCs where trust had evolved from cognition to relational-based.</i>

Table 8: Cross-case comparison of functional consequences of trust from subcontractor perspectives











Behavioural consequences	Alpha	Beta	Gamma	Delta
Effective knowledge sharing	<ul style="list-style-type: none"> • <i>Motivated to share as much knowledge towards achievement of satisfactory project outcomes so as to maintain or improve their supply chain status</i> • <i>Sharing knowledge to demonstrate competence as this is regarded as bottom-line for maintaining trust</i> 	<ul style="list-style-type: none"> • <i>Willingness to make value engineering inputs that demonstrate competencies irrespective of nature of trusts</i> 	<ul style="list-style-type: none"> • <i>Keenness to make suggestions especially on achieving DFMA agenda on project.</i> • <i>Value engineering solutions proposed to help project team when trust was cognition, systems or relational-based</i> 	<ul style="list-style-type: none"> • <i>Keenness to share any knowledge or make value engineering inputs that improve project outcomes.</i> • <i>Regular and new SCs made inputs to improve cost, quality and make time savings.</i> • <i>Contributing specialist D&B knowledge to the project although design element was not their responsibility.</i> • <i>Key driver is the desire to maintain relationship with project team.</i>
Self-organisation	<ul style="list-style-type: none"> • <i>Keen to demonstrate self-management competencies throughout the project so as to build or maintain supply chain relationship</i> 	<ul style="list-style-type: none"> • <i>System and relational-based trust promoted opportunities for self-management capabilities to be displayed.</i> 	<ul style="list-style-type: none"> • <i>Provision of highly qualified site management staff.</i> • <i>Opportunity to demonstrate competencies due to high expectations of project team.</i> 	<ul style="list-style-type: none"> • <i>Were all keen to demonstrate high performance</i> • <i>SCs were self-organised when trust was cognition, system and relational-based.</i>

Behavioural consequences	Alpha	Beta	Gamma	Delta
Relational flexibility	<ul style="list-style-type: none"> • <i>Informality throughout the project even with change management and final account negotiations</i> • <i>Make sacrifices based on future work opportunities that derive from relational-based trust</i> 	<ul style="list-style-type: none"> • <i>Switch from informality to formal and contractual relationship due to breakdown in relational-based trust which has cost implications.</i> • <i>Maintenance of informality due to relational-based trust from site level interpersonal relationship.</i> • <i>More formal and contractual relationship when there is no familiarity.</i> 	<ul style="list-style-type: none"> • <i>Expectations of project team sometimes derived from cognition, system and relational-based sources.</i> • <i>Emergence of informality due to previous relationships on other BSF projects.</i> • <i>Avoidance of any behaviour that may come across to project team as contractual.</i> • <i>Maintaining informality that had emerged due to high relational-based trust.</i> 	<ul style="list-style-type: none"> • <i>H&S and quality were a particular focus so as to meet high expectations of project team.</i> • <i>High expectations of fair and reasonable treatment in the presence of relational trust made relationship less formal and contractual.</i>
Extra commitment	<ul style="list-style-type: none"> • <i>Prioritising Alpha's activities due to high expectations</i> • <i>Tender assistance to ensure that Alpha wins a job</i> • <i>Commitment of specifically requested personnel to the project</i> 	<ul style="list-style-type: none"> • <i>Keen to help out on site to finish work that other SCs could not do due to relational-based trust.</i> • <i>Working extra (weekends) just to pull programme back on track.</i> 	<ul style="list-style-type: none"> • <i>Providing tender assistance in support of Gamma's work winning.</i> • <i>Commitment to DFMA and H&S initiatives.</i> • <i>Influenced pricing strategy as relational-based trust contributed to more flexible pricing.</i> • <i>Provision of specific project gangs requested by project team.</i> • <i>Gamma reciprocate through business support on raising the bar, H&S safety and even future work opportunities.</i> 	<ul style="list-style-type: none"> • <i>Tendering assistance to support work winning</i> • <i>Flexible pricing when project team is very familiar and trust is highly relational.</i>

Appendices
Appendix C4: Final Nodes Created in Nvivo 9 (Coding Structure)

		Context		
			Company specific issues	
			Acquired and merged	
			Central supply chain	
			Company background	
			Innovation through self-delivery	
			Offsite design and manufacture	
			Strict internal checking and governance	
		Interviewee background		
		Factors that affect trust in supply chain		
			Change management	
			Economic climate	
			Job performance	
			Payments issues	
			Perceived opportunity for future work	
			Project specific circumstances	
		Functional consequences of trust in supply chain		
			Behavioural consequences	
			Effective knowledge sharing	
			Extra commitment	
			Relational flexibility	
			Self-organising behaviour	
			Project performance consequences	
			Cost performance	
			Health and safety performance	
			Programme compliance	
			Quality of workmanship	
			Meaning of trust	
			Competence	
			Fair and reasonable treatment	
			Familiarity	
			Honesty and integrity	
			Openness	
			Reliance for help	
			Reputation	
			Nature of trust	
			Cognition-based trust	
			Relational-based trust	
			System-based trust	
			Subject and object of trust	
			Competence of company	
			Competence of project team	
			Gang that turns up on project	

Appendices

		Head office team	
		Project team	
 SCM strategy and practice			
			
			
			
			
			
			
			
			

APPENDIX D: FRAMEWORK EVALUATION

Table 1: Interview Schedule for Framework Evaluation

Evaluation Objectives	Evaluation Questions
1. To confirm if participants agree with the main elements identified in the framework.	<p>1. Do the main elements identified in the framework adequately capture supply chain management practices of main contractors, their influence on trust and functional consequences of trust during projects?</p> <p>1.1 Are the inter-relationships between the main elements in the framework reflective of the situation in practice?</p> <p>1.2 To what extent do the contextual factors identified in the framework influence your organisation's implementation of the SCM elements especially during projects?</p> <p>Subcontractor version: To what extent do the contextual factors identified in the framework influence main contractors' implementation of the SCM elements especially during projects?</p>
2. To identify if the framework presents a holistic approach for implement supply chain management from a strategic perspective.	<p>2. Does the framework provide a structured, well-informed and holistic approach for implementing supply chain management?</p> <p>2.1 Can the framework serve as an appropriate roadmap for other main contractors to implement SCM as a strategy for managing trust?</p> <p>2.2 What can your organisation do to further entrench the SCM elements identified in the framework especially supply chain finance initiatives? Supply chain finance: reverse factoring versus dynamic discounting?</p> <p>2.3 If the framework implementation guide is followed, will this facilitate selection, effective deployment and management of subcontractors during projects?</p>
3. To identify the feasibility of recommendations put forth as part of the framework.	<p>3. Are the recommendations put forth as part of this framework complete?</p> <p>3.1 Are there any particular barriers that hinder the implementation of recommendations put forth as part of this framework?</p> <p>3.2 Are there any additional recommendations that can be suggested to further enhance supply chain management implementation in a main contractor's organisation?</p> <p>Subcontractor version:</p> <p>3. Are there any particular barriers that you feel will hinder main contractors from implementing recommendations put forth as part of the framework?</p> <p>3.1 Can you share your thoughts about the current lobby for reverse factoring to become a supply chain finance strategy that helps improve subcontractor cash flows?</p> <p>3.2 Are there any additional recommendations that can be suggested to further enhance supply chain management implementation in a main contractor's organisation?</p>

Table 2: Responses from framework Evaluation

	Evaluation Questions	Alpha Supply Chain Manager	Beta Chief Quantity Surveyor	Delta Procurement Manager	Sigma Project Quantity Surveyor	Gamma Contracts Director
1.0	Do the main elements identified in the framework adequately capture supply chain management practices of main contractors, their influence on trust and functional consequences of trust during projects?	Who's done this? This is excellent. Really, really good. I think what you found out is, you proved why most good main contractors do things. We understand that unless you have good relationships, you won't have successful projects. So, having research, to back that gives me a bit more confidence that we are doing the right thing. It kind of proves the theory in the reason why we've got supply chains is risk, so, for the highest risk packages, we try people that have proven before.	I think, you've hit the nail on the head with all the elements there.	Yes, I think it's very interesting you put together a framework like this.	Yes, yes. It makes complete sense.	I suppose most things would come under those five headings.
1.1	Are the inter-relationships between the main elements in the framework reflective of the situation in practice?	Yes, but I think you should have a key. What the colours mean. I think you should have a scale in that. I would say you get a scale on the top is low and on the bottom is high. But maybe there will be a way to simplify that.	they do, I mean I see it from the point of view of day to day, you know, when we are using tried and tested subcontractors, they raise a more relaxed way of dealing with them, then they feel using the subcontractors the first time.	Yes, that makes sense, you don't need a key, ok yea when you first look at it it's a bit complicated but as soon as you pick the internal and external, it does make sense.	"Yes these are the kind of people [when relational based trust is present] we are going to take forward so when we come to tender and stuff like that we'd have these kind of people we say to the client, look, these have performed for us in the past. One of the main SCs that we worked with for 8 years on board, he	I think, one of them actually, one of the big factors that you might be missing on there is compliance. Because what we find certainly with Alpha is we have always been compliant with the bid whereas what tends to happen if you go out to the market place is that, people don't necessarily price what the enquiry is asking for. For our cat

	Evaluation Questions	Alpha Supply Chain Manager	Beta Chief Quantity Surveyor	Delta Procurement Manager	Sigma Project Quantity Surveyor	Gamma Contracts Director
					actually helped us in the whole tendering process and actually presented stuff to the client with us	one main contractors, we'd make sure that we are compliant.
1.2	To what extent do the contextual factors identified in the framework influence your organisation's implementation of the SCM elements especially during projects?	The factors have been more than ever in the industry because of the size of the recession, the length of the recession, but we've come out of the recession now so we've now secured the last three months' whole years' worth of turnover, of profitable work, so, we are out of the worst. So, yes I think the fact is that what you've put on the top is very relevant, but we are very lucky.	I think clients have got to be more enlightened on the way they are procuring work and they've got to understand that, yes, ok when you get on a competitive tender, you might get a cheap price but that's not the price you are going to pay at the end of the day so you might as well buy in and get someone and single source it	You are always going to get that, you always will. We are working for particular clients at the moment where we are struggling. And its just the nature of the way they do business but we are adapting to their requirements but still using the same supply chain most of the time. Example is their payment terms are 60 days so, logically, we should put our subcontractors on 60 days but we don't, we will still continue to pay our subcontractors on 35 days	"the client actually has an input as well so the client might have said, oh, this people performed well on this contract so the client actually informed the main contractor that these contractors are quite trustworthy	[compliance with specification] is also linked to the client influence because if the client is insisting that the job that he has, that the main contractor has got to be delivered to this specification and as per that contract, then I will be placing orders with contractors that I have got that level of relationship with.
2.0	Does the framework provide a structured, well-informed and holistic approach for implementing supply chain management?	Yes, It kind of proves the theory in the reason why we've got supply chains.	Yes, I think so, I think from a point of view of sort of first principles in the plan it deals with it quite well. Where it is possibly lacking a little bit is the consequences if things go wrong on this side [trust dimensions], if you don't manage it in the correct way.		Yea, I think so, I think the only thing that normally kicks to the window basically is that the market conditions, when we are going through any economic downturn, sometimes, relationships don't really matter and the only thing that matters is the price, which is	I think so yea, I think it certainly.

	Evaluation Questions	Alpha Supply Chain Manager	Beta Chief Quantity Surveyor	Delta Procurement Manager	Sigma Project Quantity Surveyor	Gamma Contracts Director
					what you have got right at the top.	
2.1	Can the framework serve as an appropriate roadmap for other main contractors to implement SCM as a strategy for managing trust?	Yes and I'm also quite pleased. Because I do everything, I do all the strategy for the supply chain for the company that we are doing so good out there and I'm not saying, I mean good is only there as a comparative so, I'm very proud of you, you've done well.	I think again taking on board a main contractor that maybe hasn't gone through the processes, then it certainly will start to give them a sort of an issue of benchmark as to what they've got to look to do to achieve the existing necessary trust and consistency.	Yes, a lot of new company's to supply chain management will probably struggle to understand where the well matured companies like us are coming from where we have said the strong trust-based one has added value. The problem is, you cannot put a monetary value on that.		Yes, I think it's the way you've structured that flow chart, kind of, it does capture how, if I was a main contractor looking at that, it will give me a better understanding of how to actually go about procuring a package.
2.2	What can your organisation do to further entrench the SCM elements identified in the framework especially supply chain finance initiatives? Supply chain finance: reverse factoring versus dynamic discounting?	I disagree with you totally on dynamic discounting. On average we pay 30 days so I will say our finding will be to make sure that there are reasonable payment terms that the sub-contractor is happy with, if they are not happy with the payments terms, we are able to discuss them. That is big a driver.	The one thing we should do and we're finalizing at the moment and that is to keep clear and concise records of subcontractors we used on jobs so we've got them scored etcetera etcetera...so then anybody moving down the line can look back a subcontractor and see what current work he's done and so he's performed ok and they feel comfortable and thus, moving forward but that needs keeping that information up to date on a regular basis. [On supply chain finance], I think all they want to know is when they are	We've got the controversy with the reverse factoring situation where some main contractors have standard terms of 120 days. I was going to say, if it is necessary, we'll pay quicker than even our 35 days arrangement. If a subcontractor requests it, we will look at it. Not necessarily grant that early payment every single time but if a subcontractor comes to us and says, "I need fortnightly payments we will try and facilitate it. We have got a positive cash flow so as a result,	We never look for discounts, we pay them basically. if they needed to pay it instead of the two weeks that we use to allow in terms of the signed up to their own forth nightly payment, we could reduce it down to weekly. Even nothing was agreed on paper but it was a verbal agreement and it's a trust saying ok we will actually pay you weekly	The problem that they've [another MC who is piloting reverse factoring] got now in going back to offering people two weeks or a standard of thirty days to their reverse factoring is that they don't now critique anything and the paper works and massive paper chasing, you can see the massive pressure that everybody is under to do it. So my advice to any MCs is, pay on thirty five days and do it how you are supposed to do it because then, everybody is happy.

	Evaluation Questions	Alpha Supply Chain Manager	Beta Chief Quantity Surveyor	Delta Procurement Manager	Sigma Project Quantity Surveyor	Gamma Contracts Director
			going to get paid, is clear and identifiable. As long as they know that they are happy. It's when it slides and that's not achieved, then they can't plan.	we have no reason to hang on.		I think last time we talked about face to face contact [with the supply chain management team] which I think is really important
2.3	If the framework implementation guide is followed, will this facilitate selection, effective deployment and management of subcontractors during projects?		Yes, It's outlined the three ways you can deal with subcontractors which you do see.		I think so, I think it definitely can help but I think it's dependent on who the decision maker is. Because if maybe the decision came down to our supply chain manager, he might push it to go to the top option because the price is cheaper, I might be overruled, it depends on his nature, it depends on his understanding, it depends on how contractually he is and everything else.	I think your risk profiling being the number one reason for going with a supply chain partner or going external, I think, is probably the most important factor. if you know that you've got, the risk could be anything, it be a complex job, it could be a fast job, it could be that they've underestimated the work so they need to do it on a budget so you need that level of communication with your sub-contractors. Whereas if you know you've got bones in it, you know it's got the critical path programme showing, it's got healthy, you know, construction phase time and then you know you can control it with the level of prelims you are allowed and then you just go out to the market and get your best bid.

	Evaluation Questions	Alpha Supply Chain Manager	Beta Chief Quantity Surveyor	Delta Procurement Manager	Sigma Project Quantity Surveyor	Gamma Contracts Director
3.0	Are the recommendations put forth as part of this framework complete?	It's all happening here, it's all started since we met last. So I've just held a two day BIM conference for the supply chain, they now get a BIM newsletter so it's good like all the things you are mentioning, we've picked up on here and there but I like you telling me that. And there's bits there that yes, I think it will probably make me look at things a little bit differently.	[On retentions] it's a good incentive because we can say if you do a good job and you don't have any defects, on your next job, we won't deduct retention so the incentive is there. I mean, we've been looking at the sort of retention side of it, to try and locate some improved benefits from both sides really, from our perspective, you know, no-zero defects which will be great. And also they get an aided cash flow as well.	Yes, I agree with the statements. Some of the things you have highlighted, we are aware of and we need to get more people on the ground talking within the relationship so, from the recommendations, hopefully, we will be able to put it in place. Some of the recommendations you've come out with, I will be putting a lot of reports to our board.		"The retention thing is quite a good point actually, advice MCs not to even have retentions for their cat ones. I think it would be a real big move because then you are properly embedded together and you are committed"
3.1	Are there any particular barriers that hinder the implementation of recommendations put forth as part of this framework?	I have reviewed that [dynamic discounting] with our lawyers so fine, I could say to all our subcontractors, I will pay will pay you on a hundred days but if I need to give you your money on 25 days, you can pay me two per cent. At the end of the day I am not helping the subcontractor. What we should be doing is to be paying them earlier anyway. But we do that, we pay them anyway on thirty days. That isn't cat one's, that's everyone.	I think in most instances, where the people have actually got the time to devote to it [SCM] and that is where the benefits of a dedicated supply chain manager comes in because they can dedicate the time to it. When you haven't got one of those and you pass it over to the management teams, and having to do with the other jobs, these are the nice to haves and the first you ignore. And that's the difficulty really. Supply chain management comes with	No I don't think there is any particular barriers.		Well there's always obviously cost implications So, the level of expectation when you get to that level [relational-based trust] is very high, and sometimes I prefer to work on that level [systems-based trust] and we earn more money on that level [systems-based trust], which is a weird thing, you will think it would be the other way around.

	Evaluation Questions	Alpha Supply Chain Manager	Beta Chief Quantity Surveyor	Delta Procurement Manager	Sigma Project Quantity Surveyor	Gamma Contracts Director
			a cost and it is difficult to measure whether you are actually going to get the benefits over the cost.			
3.2	Are there any additional recommendations that can be suggested to further enhance supply chain management implementation in a main contractor's organisation? Or any other additional statement?	What I'm looking at doing is, if a contractor wins a monthly safety awards, I pay them in a day, just for one month, instead of giving them a certificate. I'll just pay them. Now, our board don't like that.	We will soon be implementing a joint software interface for managing payments with subcontractors. I think that will be very beneficial [for SCs], it's interesting visual effects, they can track payments. The other thing obviously is retentions as well, there is more retention bonus where they get cash.	It's nice to be able to benchmark ourselves independently against other main contractors. We hear anecdotal evidence. Are we doing the right thing? Are we treating our subcontractors as we should do? But ermmm, it's nice to have an independent view on this.		The tester for companies who are not doing what Alpha are doing will be when the market picks up because there will be quite a lot of companies struggling, main contractors will be having a lot of problems in getting good sub-contractors working for them. if I was a client wanting a multi-million pound building built, I would want to see their SCM. It would be part of my enquiries, how have you brought your SCs through. if clients are clever, the intelligent clients out there, they would be verifying that with the company.